MARINE REVIEW

WEEKLY.] AND MARINE RECORD. [ESTABLISHED, 1878.

Vol. XXVI | Published every Thursday at 39-41 Wade Bldg by the Marine Review Pub. Co. | CLEVELAND, O., OCT. 30, 1902. | Eastern Office, 1023 Maritime Bldg., New York City. Chicago Office, 373 Dearborn St. | [Entered at Cleveland Post Office as second-class matter.] | Subscription $3.00 year. Foreign $4.50 year. Single Copy 10 cents. | No. 18

REAR ADMIRAL MELVILLE'S ANNUAL REPORT.

The annual report of Rear Admiral George Wallace Melville, engineer-in-chief of the navy, which was made public last Saturday is of unusual interest. The proposed use of petroleum as a substitute for coal on shipboard is treated at length and in such detail as thoroughly to meet the innumerable demands that have come to the navy department for the special information collected by the engineering board, composed of Lieut. Com'drs. Edwards, Parks and Bailey. For months this board has been working with a 2,000 H. P. boiler on the waterfront at Washington, testing a multitude of oil-burning devices, and the great manufacturing concerns of the country have been seeking to learn the results of the tests. Summing up the results of the board's work the report says:

"That oil can be burned in a very uniform manner.

"That the evaporative efficiency of nearly every kind of oil per pound of combustible is probably the same. While the crude oil may be rich in hydrocarbons, it also contains sulphur, so that after refining the distilled oil has probably the same calorific value as the crude product.

"That a marine steam generator can be forced to even as high a degree with oil as with coal.

"That up to the present time no ill effects have been shown upon the boiler.

"That the firemen are disposed to favor oil and, therefore, no impediment will be met in this respect.

"That the air requisite for combustion should be heated if possible before entering the furnace. Such action undoubtedly assists the gasification of the oil product.

"That the oil should be heated so that it could be atomized more readily.

"That when using steam higher pressures are undoubtedly more advantageous than lower pressure for atomizing the oil.

"That under heavy forced draft conditions, and particularly when steam is used, the board has not yet found it possible to prevent smoke from issuing from the stack, although all connected with the tests made special efforts to secure complete combustion. Particularly for naval purposes is it desirable that the smoke nuisance be eradicated in order that the presence of a warship might not be detected from this cause.

"That the consumption of liquid fuel cannot probably be forced to as great an extent with steam as the atomizing agent as when compressed air is used for this purpose. This is probably due to the fact that the air used for compressing purposes after entering the furnace supplies oxygen for the combustible, while in the case of steam the rarefied vapor simply displaces air that is needed to complete combustion.

Upon the subject of oil fuel in the navy the report says:

"The more this question is investigated the more intricate seems the problem of successfully installing an oil fuel appliance on board a battleship. It ought to be successfully used on the torpedo boats, as well as upon auxiliary naval vessels that steam between regular ports. For the army transport service it might prove very desirable, since a supply of oil could be maintained at the several calling ports. In regard to the installation on the large powered battleships and armored cruisers, there are three distinct features which must be considered, namely, the mechanical, the commercial and the structural. Regarded from two of these points of view, it seems as if it would be some time before 'coaling ship' ceases to be an evolution upon the war vessel. While both the naval and mercantile vessel transverse the ocean, there is a wide difference in their construction, as well as in the nature of the duty performed, and this must be taken into account in designing the motive plant."

The first line of inquiry by the board was the engineering or mechanical feature, involving the possibility of successfully burning oil for steam purposes, and it is said that this problem is nearing solution. It has been found necessary to atomize the oil (it cannot be completely gasified) instead of using it without pressure. The air blast should be heated by some simple device. If this is done properly the experiments have shown that it will be possible to force the combustion of oil to the same extent as coal, something not done before, but essential for naval uses. Treating of the commercial aspects of the question, the report makes the following important statements:

"It may be regarded as a certainty that, except where unusual conditions prevail, the cost of oil for marine purposes will generally be greater than that of coal. The cost may be less for vessels departing from the Gulf and California seaports, but the rule will hold elsewhere. While the question of cost should be of secondary importance in military matters, it must be taken into consideration. It is the expense of transportation that will always prevent oil from being a cheap combustible. While it may be put on the tank steamer very cheaply at ports like Point Sabine, its commercial value will be determined by the cost of delivery at commercial and maritime centers. This feature of the problem is beyond the ability of the navy to control, but it must be regarded as an important phase of the subject."

It is then shown that it would be more expensive and difficult to store oil than coal, and that the fumes are dangerous in places like the small bunkers and double bottom spaces aboard ship, where, being heavy, they cannot be easily blown away. But in spite of these and other objections the report says: "The bureau has no hesitation, however, in declaring that, in view of the results already secured by the liquid fuel board, an installation should be effected without delay on at least a third of the torpedo boats and destroyers. The junior officers of the service are very much interested in the matter, and if several boats are equipped entirely with oil fuel appliances, a spirited and keen but friendly rivalry will be created, which will result in a material increase in the efficiency of the torpedo boat flotilla. Such an installation would also permit a competition to be established between the boats using coal and those using oil, and this would be another incentive to cause systematic and careful study of the subject upon the part of all connected with the torpedo fleet."

By way of encouraging the advocates of oil further, the report points out that the structural disadvantages which may prove so serious in the case of the navy would not be encountered in shore plants, which also could easily maintain reserve supplies of the liquid fuel. One of the most important conclusions is that the trial has shown that there is little or no advantage observable in favor of any particular form of burner. On this point the report says:

"The efficiency of oil fuel plants will be greatly dependent upon the general character of the installation of auxiliaries and fittings, and, therefore, the work should be intrusted only to those who have given careful study to the matter, and who have extended experience in burning the crude product. The form of the burner will play a very small part in increasing the use of crude petroleum. The method and character of the installation will count for much, but where burners are simple in design and constructed in accordance with scientific principles, there will be very little difference in their efficiency. Consumers should principally look out that they do not purchase appliances that have been untried and have been designed by persons who have had but limited experience in operating oil devices."

Admiral Melville says with great frankness that the personnel act has proved a failure as it is administered, and he declared that half of the officers of the navy have yet to be convinced of the benefits of amalgamation. To use his own words, in referring to the personnel act: "It was rather a revolution than progression in naval development when congress enacted a law whereby every naval officer of the line had in the future to become a fighting engineer."

European experts, he says, declare that either their own navies were not properly organized or the United States made a mistake from which it would not recover for at least twenty years. Still Admiral Melville thinks that if the law were administered with a desire to make it a success it would give the most efficient navy in the world. To that end he wants an engineering laboratory at Annapolis like that at Charlottenberg, Germany, for experiments and the education of young line officers in engineering. He also asks the establishment of a post-graduate course in engineering at the academy; the detail of a junior line officer as understudy to engineer officers on shore duty, such junior officers to be placed in charge of the machinery of torpedo boats and auxiliary craft; that promotion be denied to line officers who do not take their turn at engineering work; that graduates of technical colleges be permitted to compete for naval commissions; that 100 additional warrant officers be appointed; that naval training be had at every naval station; that the pay of the boilermen be increased, and, finally, that the name of the bureau of steam engineering be changed to that of engineering, and that it have charge of all machinery on shipboard except that pertaining to the guns.

Last week the Review mentioned that the retiring president of the Boston board of trade, Mr. J. Richard Carter, has advocated a state-built dry dock for Boston. It is interesting to note, however, that opposition has advanced to the plan along the lines mentioned in the Review, and it is reasonably certain that Boston will get its dry dock facilities without an appeal to the public treasury. The Fore River Ship & Engine Co. at Quincy, a suburb of Boston, will shortly install a floating dry dock in its establishment which will be large enough to care for any ships that go to Boston.

WORLD'S SEA FORCES.

Three periods of wonderful naval development have marked the history of the United States navy. There have been two periods of decadence and one of inactivity in any line of expansion. The ships of the Constitution and Constellation class represented the first period of marked naval development, and with the close of the war of 1812 this country found itself in possession of a formidable fleet of fine fighting craft that had made the service famous among the older nations of the world. The navy made little advance from that time until the early 40's, when a considerable number of ships were added, and with the establishment of the naval academy at Annapolis in 1845, further interest was taken in the service by congress and more liberal provision made. At the outbreak of the civil war the navy was strong, but within the following four years its development was a marvel among naval powers. Thus in 1865, with the close of the war, the United States was able to muster a fleet of more than 600 fighting craft, a number never before or since equaled. There came the period when the country believed that it required no navy, and allowed its force to dwindle, and in fifteen years the United States had fallen to the sixth or seventh place among the naval powers.

YEARS OF DECAY.

This decadence continued until 1882, when a house naval committee made a report showing the disgraceful condition into which the navy had fallen and the urgent necessity for corrective steps. Congress heeded the report, and in the next year provision was made for the four Roach cruisers, which the government later completed at its navy yards. Eighteen years ago it was a painful fact, recognized by all naval officers, that the United States was not capable of coping with Chile on the seas. To-day this country has a navy, including ships under construction, that places it fourth, and possibly third, among the naval powers of the world. From seventh or eighth place fifteen years ago the United States has advanced to rank about even with Russia and exceeded only by Great Britain and France. Germany has not the tonnage equalling that of the United States, nor will her fleets be so large and powerful under her present program of increase six years hence. It has been in the last ten years, perhaps, that the navy has expanded most rapidly.

The condition of the United States navy, including ships now building, is: Ten battleships have been built, representing 112,000 tons displacement; there are also ten building representing a displacement of about 130,000 tons. The Texas, now rated as a second-class battleship, together with seven monitors designed for coast-defense purposes, gives a tonnage of 35,000 of this class, to which must be added four monitors building, with a tonnage of 12,856. The United States has two armored cruisers in commission and six building, representing about 100,000 tons displacement. There are also two first-class protected cruisers in commission and three building, while twelve cruisers of the second-class are built and six are building. Of the unprotected class, vessels of between 1,000 and 2,000 tons, this country has twenty-eight built, and of those below 1,000 tons ten. To these must be added forty-five destroyers and torpedo boats, practically all of which are completed, and seven submarine boats. Eight training vessels and a large number of smaller craft, complete the strength of the navy. It, therefore, will be seen that the United States navy, at the present time, comprises 110 vessels built, representing 315,000 tons, and sixty-three building, representing 290,000 tons, which makes the total tonnage of the American navy about 590,000 tons.

MORE THAN DOUBLED IN TEN YEARS.

Ten years ago the total tonnage of the American navy, including all the old war monitors, wooden ships and every other class, was less than 200,000. The United States then had among some of the new steel ships the Atlanta, Baltimore, Bennington, Boston, Charleston, Chicago, Cincinnati, Detroit and Dolphin. But there was not an armored cruiser, first-class battleship or torpedo boat completed in the list. From a minor strength the navy has grown in ten years to one that commands the respect and admiration of the leading foreign powers.

Ten years ago saw the beginning, however, of a large number of ships which have later become famous. The Oregon and the Massachusetts, the Indiana and the Cincinnati were then building, but it has been only within the last seven or eight years that the new navy may be said to have taken substantial shape. In 1885, according to the navy register, there were not more than fifteen ships available for cruiser purposes, and only four new ones had been ordered. It was between 1885 and 1895 that the greatest advances were made in modern naval development.

DEVELOPMENT OF THE CRUISER.

In that time all types and classes known to modern navies were designed, and at least one or more of every class constructed. It was recognized that the first ships should be those to show the flag in foreign ports and for the ordinary protection of American interests. Therefore, it was of paramount importance to have a suitable number of cruisers immediately, and for that reason all of the earlier ships were of that class, little suited for heavy fighting purposes. Then came a period when congress looked to the heavier vessels as necessary for a well-rounded navy, and the first of the battleships were authorized in the early 90's. Prior to this, however, the government had begun the construction of the second-class battleships Maine and Texas, which were the first heavily-protected vessels the new navy had. In recent years the policy of the navy department has been to confine its increase program exclusively to more formidable ships, those types which would be depended upon to stand and deliver with the best of the foreign-built ships.

There is not one of the six great naval nations which has advanced with such marvelous rapidity as has the United States within fifteen years. While in actual number of vessels built and building this country stands last in the list, it is exceeded in total tonnage represented only by Great Britain, France and Russia by a very narrow margin. This country is ahead of Germany, Japan, Italy and Austria. The United States, therefore, may now be ranked, if total tonnage is accepted as an indication of fighting strength, as the fourth, and possibly the third, naval power in the world.

GREAT BRITAIN'S GROWTH.

Great Britain's naval progress has been marked since the close of the Franco-Prussian war by a steady annual increase, until her strength is now unquestionably superior to that of any three European nations. Her policy has always been to maintain a naval force at least equal to that of any two combined European nations. Ten years ago Great Britain's navy had reached the flower of perfection in construction and equipment. From Great Britain the other powers derived many of their ideas regarding the design of the higher type of warships. She was then in possession of a large fleet of armorclads, including the magnificent Victoria, the finest battleship of her day, now resting in 100 fathoms of water near Malta as a result of the disastrous blow from the Camperdown. That catastrophe awakened the British public to the great danger involved in the tactics executed by the ill-fated admiral Sir John Tyron, of the Victoria. England has always in measuring her naval strength, included a large number of ships built fifteen or twenty years and more ago and now regarded as obsolete. Her immense total tonnage of more than 2,000,000 is partly made up of vessels that cannot be regarded as strictly of the highest type. Yet she has a superb fleet of highly protected, modern-designed battleships and armored cruisers. In the last ten years she has advanced continuously, but perhaps not so rapidly as the United States, Germany or Russia, although in number of ships built she has exceeded any two of these nations.

Great Britain has completed forty-two battleships and she has eleven building. Of these at least thirty-five may be regarded as of the first-class. She has twenty-nine other battleships and coast-defense vessels and nineteen armored cruisers built and twenty-one building. Her protected cruisers number twenty-one of the first-class, fifty-four of the second, forty of the third and twenty-two of the fourth. Besides, she has ten vessels of these classes building. There are also sixty-four gunher by one of this class. Her total tonnage of vessels built and building, of the first-class and at least 150 of the second. She has in all 586 vessels built and 110 building, or an aggregate of nearly 700, representing more than 2,000,000 tons.

WHAT FRANCE IS DOING.

France has devoted a large part of her attention in the last ten years to the construction of battleships and armored cruisers. In this period she has increased her total tonnage of about 200,000. Ten years ago France had less than ten battleships. She has now nineteen built and three building. She has also twenty-five battleships of the second-class, ten armored cruisers built and fifteen building and a vast number of all other types of vessels, making a grand total of about 835,000 tons. It is estimated that within five years France will have a fleet of thirty battleships alone.

GERMANY'S TEN YEARS' PROGRESS.

Germany began the development of her navy almost coincident with the United States. Ten years ago her navy was superior to this country's for the reason that practically all of her ships were modern, while those of this country were chiefly obsolete. Germany is adhering to a program of increase which will be completed in 1907. Meanwhile few additional vessels are expected to be authorized. If the United States, therefore, maintains a steady policy of increase it should be superior in sea-fighting force six years hence to Germany. Her heavy vessels comprise nine battleships with seven building. In this type the United States leads. Germany has thirteen vessels classed as battleships and coast-defense vessels, but few of these are line-of-battle ships. Five armored cruisers are built and five are building. As compared to the United States the latter surpasses her by one of this class. Her total tonnage of vessels built and building is about 478,000.

JAPAN'S STATUS.

Japan, which since her alliance with Great Britain must be reckoned as a naval power, has built and building a total of 176 vessels of all types, aggregating 260,000 tons. She numbers six battleships and seven armored cruisers among her heavier vessels. Of late she has made little progress toward naval increase. Russia will shortly have a naval fighting strength considerably superior to that of Germany. She has completed thirteen battleships, with six building. She has also twelve

armored cruisers completed, a total of 351 vessels with a tonnage of 598,000.

Italy and Austria have shown but little progress toward naval increase in the past ten years, due almost wholly to their depressed financial conditions. Italy's total tonnage, built and building, is 350,000, while that of Austria is 158,000.

ALL SHIPS GENERALLY ALIKE.

Battleships, armored cruisers and, in fact, all types of war vessels do not differ in many essential particulars among the world powers. Each nation has its own ideas regarding the design of its ships and the mounting of the batteries, but in recent years there has been a growing tendency to similarity. The English, American and Russian battleships differ little in armament and armor. Displacement for displacement they are about equal. In appearance they differ but little. In arrangement of batteries and gun-calibers there is now no marked distinction. Few nations mount guns larger than of 12 in. in the main batteries, whereas a few years ago the caliber was greater. Some Italian vessels, in fact, mounted 15-in. guns. The United States was quick to follow the general tendency of reducing the caliber of guns, and now none of the heaviest battleships is greater than 12 in., and they are infinitely superior in penetrating power to the 13-in. rifles of the Oregon class.

Vast improvements in ordnance have rendered the reduction in caliber possible. So marvelous have these improvements been that a 10-in. rifle now is regarded as equal to the old 12-in. gun. The widest departure from the generally adopted idea of gun mounting in ships has been made by the United States in the superposed turrets system applied to the battleships Kearsarge and Kentucky. No naval power has guns mounted in such manner, or in any way approaching this. It was the greatest departure from the prevailing methods of main-battery mounts ever made in the history of ordnance.

AHEAD IN INSTRUCTION.

As the types of ships differ with nations so do the methods of instruction afforded the personnel. The foreign navies concede that the United States possesses a personnel of higher trained officers theoretically and practically than any power in the world. Annapolis is admitted to be the greatest naval school in the world, and the American naval officer is regarded as the most scientific officer of all those afloat. The American seaman is not only the best paid, but the best fed and the best treated seaman in the world. He is probably from a higher class than the seaman of other nations. The training he receives is said by our officers to be infinitely superior, and on the whole he is broader, better informed and more scientific than his brethren in the English, French and German navies. The American system of training seaman is that which takes the greenest man and turns him out a first-class seaman in a year or two. He is sent to one of the several training ships and there instructed for a year, and then transferred to a seagoing ship, where he becomes an ordinary seaman, then to petty officer and possibly to the grade of non-commissioned officer. And now, under recent congressional action, he may become a commissioned officer and a rear-admiral if he is selected for the examinations held yearly for the appointment of four or five men from the ranks to commissioned grade. The American navy is thus the only service where it is now possible for the sailor to reach commissioned rank.

MORE TARGET PRACTICE.

There is no navy in the world that devotes proportionately more money, time and attention to target practice of all sorts than the American, and the results attained seem to justify the thousands of dollars expended annually. Next to the United States navy that of Great Britain practices more regularly with its guns, while France expends treble the amount this country does, on account of the great size of her establishment and the liberal appropriations granted for this purpose.

Germany is now ranked almost with the United States in point of naval strength, but there has not been that same careful observance of the necessity of perfecting her seaman in marksmanship that has applied to other countries. Her fleets are small as units and few compared to those of Great Britain and France, and the greater part of their time is consumed by evolutions at home, whereas the greater squadrons of England and France operating in the Channel, the Mediterranean, China and elsewhere carry out regular specified periods of drill in great-gun practice. There is not that same scrupulous care observed by the German service, too, in the instruction of the personnel and the method of handling its great guns that appears in the French, British and the United States services.

TWO KINDS OF PRACTICE.

Two kinds of target practice are required in the United States navy, sea practice and record practice. Stringent rules have been provided by the department prescribing six sea practices and one record practice annually, and any failure to hold such practice must be fully explained, and only in the case of the best of reasons will the omission be considered justifiable. If vessels are in port when target practice is due they are compelled to get under way, proceed to sea and carry out their instructions. The object of attack is a triangular sail of three sides, with a pole in the middle of about 15 ft. in height, stuck in a wooden frame, which serves as a float. At a distance of a mile this little affair is often scarcely visible to the naked eye. And yet the great battleships and cruisers, steaming at 8 knots, frequently knock it to pieces at a distance of 4 or 5 miles.

Sea practice with great guns is conducted either on or off soundings at ranges varying from 800 to 3,000 yards, the ship steaming at any rate the commanding officer may direct. This practice is intended to stimulate as nearly as possible the conditions of actual battle, and the rules of the navy require the details of observing the fall of shots, and the accuracy of fire shall not be allowed to unduly interfere with the spirit and continuous fire. Guns are loaded and fired just as quick as they would be if they were engaging an enemy. The rate of the ship's speed varies between bare steerageway to that of highest rate under forced draft. The entire crew is at quarters, battle hatches are down and the ship is stripped clear. The doctors get out their saws and knives and hammocks are slung for lowering the supposed injured to the operating room below. The captain takes his place in the conning tower, the secondary batteries are manned, marines stationed in the military tops and the ship and her crew to all intents and purposes are ready to engage an imaginary enemy. Then the battle opens. Like great swans the graceful cruisers circle around the target, letting go first one battery and then the other as they come up on the other side. The ponderous battleships pour in their mammoth projectiles and if the pole has not been knocked to pieces at the end of 15 minutes, it is because the practice is not up to the navy's standard.

It costs the government very little to construct these targets and any ship can make one in a few hours, and for this reason a good many can be destroyed in the course of a few hours' practice without the government spending more than $100. But it is not so with the ammunition. Every time a 13-in. gun is fired at full service charge the 1,000-lb. projectiles, backed by 500 lbs. of powder, is hurled into the sea. The powder costs $1 a pound and the projectiles $200. Armor-piercing projectiles, however, are not used in target practice. They are too costly and the same results can be obtained with the cast-iron or semi-armor-piercing type. As often as once each year the whole or part of the secondary battery allowance for one sea practice is expended at night, search-lights being used to illuminate the target.

IN THE SMOOTH-BORE DAYS.

In the days of the old smooth-bore gun, which passed away with the development of the modern rifled ordnance and steel-sided ships, target practice was not so general or expensive as that of today, neither were the weapons so accurate. Fifteen or twenty men were required to handle one of the old 8-in. guns, where six can now load, fire and operate the powerful 12 and 13-in. weapons. The smooth-bore gun was loaded by a tedious process and fired with a primer, trained by heavy spikes and run out by ropes. Today the big guns are practically loaded by electricity or hydraulics and the powder is ignited by electricity, the guns trained by the same power and the whole operation of fighting these formidable pieces conducted by one-half the number of men necessary fifteen years ago. Several minutes were required to sponge, load and fire the old gun; now with a quick firing 6-in. gun at least a dozen shots can be discharged in a minute.

One reason probably why American gunners are such experts is the competition between gun crews for attaining the highest averages for a quarter practice. In every fleet the rivalry runs high as to which ship shall carry off the honors of being the best at target practice. This spirit assures success, and additional inducements are offered in prizes authorized to be awarded by commanding officers of crews that make the highest record. Two classes of prizes are offered, one of $10 and one of $5. For every twenty-five men who take part in the quarterly target firing the commanding officer may award one first and one second prize, provided that the prizes shall be awarded to the men who stand highest of all those competing in the target firing.

ACCURACY OF RANGE.

Something about the effective ranges of American guns is timely and interesting. The question of a gun's range counts for little unless it is pointed accurately and the distance of the object to be attacked correctly obtained. For every inch of caliber a modern weapon has its range should be a mile. A 6-in. gun, however, can carry a projectile not more than 3 or 4 miles. A 13-in. gun when elevated to its full limit is capable of propelling a shell 13 miles, but no naval battles even with guns of such type are supposed to be fought at greater distances than 5 miles and generally at about three. At no time were the American ships more than 1 mile from the Spanish vessels in the recent fight soon after the chase was well on. In order to point the guns accurately at a target from 4,000 to 7,000 yards telescopic sights are used on all the heavy guns. But with the smaller guns this is not necessary.

The number of men required to man naval guns, both of the British, French, German and American navies, is about the same, although the French are understood to have more men as a rule for some of the larger guns. For the 4 and 5-in. all services require about four men to work each piece; for the 6-in. six men are needed, and for the 10, 12 and 13-in. the same number. As nearly all our 8, 10, 12 and 13-in. guns are used in pairs and mounted in turrets the twelve men working

them are protected by heavy plates of steel. For the little 1-pounders three men are necessary to work them rapidly, and for the 3 and 6-pounders four men are assigned, and for the Hotchkiss three men. Treble the number of men seemed to be required to work the same caliber of guns in the coast defense system. although there is no special reason for this, unless it be due to the fact that the army guns are mounted on disappearing carriages and are not provided with turrets, which naturally limits the space of the operators. An army 8-in. gun takes fifteen men to work it; a 10-in. gun requires eighteen men and a 12-in. gun, the largest now constructed by the army, calls for twenty-one men. It will be seen, therefore, that a 13-in. naval gun is operated by six men, while an army gun of 1 in. less caliber calls for twenty-one men. The navy gun can be fired just as rapidly with its six men as the army gun can be fired with its larger number.

DIFFERENT TYPES OF ORDNANCES.

The various types, designs, sizes and calibers of ordnance used by the powers of the world, both in coast fortifications and on warships, are almost as numerous as the different makes of small arms, but type for type, there is very little advantage of one over the other when of the same general caliber. The tendency for the last ten years has been toward a reduction of the size in all guns, rather than to increase them, and this has been due to the increase power of the weapons and the desire to save weight, especially on shipboard.

The Italian navy, for example, has guns mounted on some of its great coast-defense battleships weighing 110 tons, but they are so large that few shots can be fired in a comparatively short time. They are huge affairs, throwing projectiles that would go through 20 in. of steel or 30 in. of iron. There is not a vessel afloat that, if struck, would not be badly damaged by the shot of one of these guns. Yet in order to install these great pieces of ordnance the ship's efficiency has been sacrificed in other directions, and the result has been to obtain battleships with such draught that they can enter only the deepest harbors, and are unable to cross the Atlantic on account of lack of coal capacity.

The British and German navies were for several years supplied to a limited extent with almost as powerful guns, but of late none of the powers has been installing ordnance heavier than 12-in. on their most formidable types of battleships. England believes that a 12-in. gun is capable of penetrating the armor of any vessel under normal conditions, and that the weight saved by substituting the lighter for the heavier gun admits of the general efficiency of ships being vastly increased.

The French navy has but one general type of gun of the larger class for her ships and fortifications, that known as the Canet, which is one of the best guns made. Germany uses the great weapons manufactured by the famous Krupp Co., which has also furnished ordnance to nearly every power of the globe but the United States. Krupp guns are of the built-up pattern, varying in calibers from the smallest to those of 16 in. and reckoned as equal to the best ordnance of the Armstrongs, by whom the greater part of England's guns are turned out.

England at one time asserted that her 13-in. rifles were good for only 100 rounds. This country has supposed that that its ordnance had also a limit of endurance, but it is told now by the experts that they will last almost indefinitely. Not since new guns were made had it been necessary to replace an old one on shipboard by a new one, except where an accident has occurred, which was a rare occurrence.

COALING WHARF AT PUGET SOUND NAVY YARD.

The Puget Sound Bridging & Dredging Co. is constructing a coaling wharf and storage shed at the Puget Sound navy yard. The entire structure, including the coaling plant and the wharf beyond, will have a length of approximately 1,300 ft. It will be in 30 ft. of water at low tide which will make it possible to coal the largest battleship in the navy at any time. The plant will be equipped with apparatus capable of coaling a ship at the rate of 200 tons per hour. When this plant is completed the Puget Sound navy yard will not only be highly efficient but its advantage over Mare island in lower cost of maintenance will be even more conspicuous than it is now; for while at Mare island the government is under continual expense in keeping open the ship channels, owing to the shifting bottom, the deep water approach at Puget Sound is permanent.

Specifications for the work were sent out in May, and on Aug. 14, 1902, the plans and estimates prepared by the Puget Sound Bridging & Dredging Co. were accepted, the contract was signed, and work began immediately. Under the terms of the contract the work is to be done for $259,750, and is to be completed in ten months from the time of beginning. The new plant will be at the western end of the navy yard, about 100 yards east of the boundary. It will consist of two principal parts, the storage shed and coaling plant, which will be 620 ft. in length from the shore end, and the wharf which will extend for 650 ft. beyond the outer end of the shed. The shed, or storage plant, will be divided into bins of suitable size for handling coal easily and quickly, and will be connected with the outer wharf by an electric car system. The shed will be 92 ft. wide, 55 ft. high, and 620 ft. long, with a total storage capacity of 22,000 long tons. The wharf where the actual coaling operations will be carried on will be supplied with two movable steel towers which will operate along the outer 350 ft. of the wharf, leaving about 300 ft. of trestle carrying the car tracks from the main shed to the outer wharf. The towers will be 80 ft. in height, and will have arms or booms of 60 ft. in length that can be swung out over the deck of a collier. In coaling a warship the coal will be run through shutes from the bins at the end of the wharf directly into the bunkers of the ship.

For 350 ft. along the coaling wharf a channel will be dredged 100 ft. wide, 350 ft. long, and 30 ft. deep. The material secured by the dredging will be used to fill in under the storage shed, with the result that the shed will be put practically on solid ground.

As soon as the contract was signed the contractors began preparations for carrying on the work by the most improved methods of construction. Buildings were erected near the scene of the work, and a little colony of workmen moved in and took possession. Sleeping quarters and a mess-house were built for the men, a general office building for the company, and an office for the government inspector, together with a power house and shop building. Everything possible is being done by machinery. The plant for driving the 5,000 piles that will be required is made of two land pile drivers with double drum engines, and 3,000-lb. hammers, and two floating pile drivers of heaviest construction. One of these floating pile drivers is equipped with a Warrington-Nesmyth steam hammer. This is the first time this steam hammer has been used in contract work in the northwest. The hammer itself weighs 5 tons, and rests directly on the head of the pile, striking seventy blows a minute and keeping the pile constantly in motion until it has been driven to the desired depth. This method is particularly desirable where the pile must be driven through packed sand, for the practically constant motion prevents the sand from settling under the bottom of the pile. For building the shed a timber tower 60 ft. in height has been erected, equipped with a four-spool bridge-erecting engine. The equipment also includes a steam cut-off saw for cutting and squaring all timbers used in construction, an air-compressing plant which will furnish power for driving all wood-boring tools, and air hammers for driving spikes. The materials to be used will include 3,500,000 ft. of Puget sound fir, 5,000 piles and 500 tons of iron and steel. The piles will be treated by the "Perfection" process to protect them from the attack of the teredo.

PROGRESS OF WORK AT FORE RIVER.

Quincy, Mass., Oct 29.—The United States government has contracted with the Fore River Ship & Engine Co. for the largest guns of modern type ever made in New England. They are 6-in. 50-caliber guns of the latest rapid-fire model for use on warships. Within a week after this contract was signed another was placed with the same company for a lot of 3-in. 50-caliber guns, which are also for naval use. Ten sets of the 6-in. guns are called for. They are of the most approved pattern for the main batteries of battleships and cruisers. Sixty sets of the smaller pieces, which are used in the secondary batteries of the larger vessels of the navy, will be made. The guns will be forged, oil tempered and annealed, bored, and turned at Fore River and then sent to the shops at the Washington navy yard to be finished.

All of the material for the steel bridge which is to replace the old wooden turnpike bridge connecting Quincy Point and Hingham, Mass., is ready in the Fore River ship yard, which has the contract for building the new structure, and the construction work will be begun in a few days. Each of the seven sections, including the 100-ft. draw span, will be completed on land, in the ship yard, and when all are done will be floated out, one after another, and set on the concrete piers, which are already finished. It is calculated that one span can be put in place at each high tide, so that the work of substituting the new structure for the old one will take about four days.

Rapid progress has been made on the cruiser Des Moines since she was launched in September. Her pumps and other auxiliary machinery are now being put in and her decks are being laid. The propelling engines have been tested in the machine shop and are ready to take down and put into the vessel's hull as soon as the work on the engine room is sufficiently completed. The traveling gantry crane which is to serve the fitting-out dock at which the Des Moines is moored, and which will be used for installing the heavier part of the vessel's equipment, is all set up except for the jib, which is ready for hoisting into position at any time.

The first of the two steel car floats building for the New York, New Haven & Hartford railroad will be put overboard about Nov. 1, and the other a week later.

The stem castings of the twin battleships New Jersey and Rhode Island were hoisted into place last week and the plating of the fore part of the vessels' hulls will be begun soon. The 'midship section of the hull and decks as far up as the protective deck, and well forward and aft, is already nine-tenths finished on both vessels, which show about the same degree of completion. The decks of the battleships are double plated, red lead and cheese cloth being used to secure perfect contact between the metal sheets, which are fastened together with inch rivets. The first of the heavy armor that will cover the exposed parts of the vessels has arrived at Fore river.

NAVAL ARCHITECTS AND MARINE ENGINEERS.

The tenth general meeting of the Society of Naval Architects and Marine Engineers will be held at No. 12 West Thirty-first street, New York, Nov. 20 and 21. The program is an unusually long one, some sixteen papers altogether to be read and discussed. The program is fairly well balanced, though, as usual, the navy department has the lion's share. It is to be hoped that the papers will be submitted and printed well in advance of the meeting, in order that the members may thoroughly digest their contents. At the meeting last year several of the most important papers were not distributed until the day of the meeting and the members were utterly unable to discuss them. Following is the program of the two days' session:

THURSDAY, NOV. 20.

1. "Technical Training for Shipbuilders," by Henry S. Pritchett, LL.D.
2. "Progressive Trials of the Screw Ferry Boat Edgewater," by Edwin A. Stevens, vice president and Charles P. Paulding, junior.
3. "Why it Takes So Long to Build and Equip a Naval Vessel for the United States," by George W. Dickie, member of council.
4. "The Preliminary Official Trial of the United States Battleship Maine," by Assistant Naval Constructor J. W Powell, associate.
5. "The Water-tube Boiler in the American Mercantile Marine," by Wm. A. Fairburn, member.
6. "Longitudinal Bending Stress on Damaged Ships," by George C. Cook, member.
7. "Some Problems on the Surfaces of Buoyancy and of Waterlines," by Prof. Cecil H. Peabody, member of council.
8. "Experiments and Formulae on the Strength of Ship's Beams," by K. G. Meldahl, naval architect, Germany.

FRIDAY, NOV. 21.

9. "Vibration of Steamships; with Special Reference to Those of the Second and Higher Periods," by Rear Admiral George W. Melville, engineer-in-chief, United States navy, vice president.
10. "The Development of Modern Ordnance and Armor in the United States," by Rear Admiral Charles O'Neil, chief of the bureau of ordnance, United States navy.
11. "Remarks on the New Designs for Naval Vessels," by Rear Admiral Francis T. Bowles, chief constructor, United States navy, vice president.
12. "The Tactics of the Gun," by Lieut. Com'dr. Albert P. Niblack, United States navy, associate.
13. "The Possible and Probable Future Developments in the Use of Electricity on Board Ships," by F. O. Blackwell, Esq.
14. "Submarine Boats; Their Present Development and Future Possibilities in Naval Warfare," by Lawrence Y. Spear, member.
15. "Measurement Rules for Yachts with Special Reference to Racing Conditions," by F .W. Belknap, Esq.
16. "Prize Competition Paper."

The council of the society has recommended that the entrance fee of members and associates be placed at $10 and juniors at $5, with annual dues of $10 for the former and $5 for the latter. Members of the society are now voting by mail on this proposed change in the constitution.

In connection with the coming annual meeting the New York Ship Building Co. of Camden, N. J., has, through its president, Mr. H. G. Morse, extended an invitation to members of the society to visit its works on Saturday, Nov. 22. The ship building company has generously provided a special train, which will take members from Jersey City directly to the works of the company in Camden.

VALUE OF SUBMARINES.

Much interest is displayed by officers of the navy in the coming official tests of the new submarine boats Moccasin and Adder, which will be held next month, Peconic bay, Long Island Sound, will probable be selected as the ground, and the course will be off Shelter island, where the boats will be tuned up for the occasion. Exceptional care has been taken by the officers in charge to make these tests as comprehensive and as rigorous as is fair to the contractors. The tests will be for endurance, speed, stability, dirigibility, torpedo discharge and general performance. Rear Admiral George W. Melville, chief of the bureau of steam engineering, who is the most pronounced opponent of the diving type of submarine boat, has called the attention of officers of the navy to what they may expect, if the tests prove successful, and has sounded a note of warning in an article, in which he says:

"If the boat has any military or strategic value we should change our policy of ship construction, for nothing could justify the building of so many battleships if the submarine boats possess even a portion of the advantages that their advocates claim. From the time that the senate and house naval committees look with favor upon these boats, there will be a decreased construction of battleships and the action of congress in striking out of the naval appropriation bill of 1901 all authorization for battleships and cruisers can certainly, in part, be traced to the belief that the submarine possesses many of the qualities claimed by its advocates.

Rear Admiral Hichborn, who was many years chief of the bureau of construction, in discussing the subject, said: "The smaller countries of the world are greatly interested in the question of submarine torpedo boats. You can easily see what their success means to nations like Portugal, Brazil, Venezuela, Norway, Mexico, Chile, and many other countries with seaports which they are anxious to protect, but without the necessary means to either equip a suitable navy or erect and maintain extensive land fortifications. The cost of a modern battleship or armored cruiser of the first class is about $6,000,000. That would construct almost forty submarine boats, so that for the equivalent of one great fighting machine almost any country in the world, and especially the smaller ones, could secure enough submarine boats to defend its harbors. I consider a thorough blockade of a harbor defended by such boats a practical impossibility, for the most intrepid commander would not maintain his fleet in the mouth of a harbor at night exposed to their attacks, but would draw off to sea, thus enabling the defenders to get out or their friends to slip in. The new boats are the first to be constructed under the direct supervision and inspection of officers of the navy and under contract with the United States government. Many improvements have been made over the Holland in the new boats. I confidently expect them to demonstrate the value of submarine boats and make their construction a permanent part of the naval program.

OUR PROSPERITY AS REFLECTED IN BRITAIN.

The prosperity of the United States is counted as a reason for the prosperity of Great Britain and her colonies by the British Trade Journal. "So great has been the prosperity of the United States," it says, "during the past two years that the demand among the people of the republic for many classes of agricultural produce and of cattle has exceeded the supply. Hence, there has been a falling off in the exports of these commodities to Europe, and the result is witnessed in the higher prices now prevailing there. Yet another reason for the rise in prices was a shortage of the corn crop of 1901."

"At present," the article adds, "there is no sign of any falling off in the United States (home) market. Industrial activity continues at a high pressure, and even the enormous production of pig iron (amounting now to about 18,000,000 tons per annum) of the United States is inadequate to meet the requirements of its general building, ship building, hardware, and other trades in which iron or steel is employed, and the consequence has been that during the last few weeks large shipments of pig iron and steel have been made to the North American republic from Great Britain and Germany."

Commenting upon the effect of the extreme prosperity in the United States upon conditions in Europe and in British colonies, the article adds: "So long as this business activity lasts in North America there is little probability of a fall in the price of meat and other foodstuffs. The consumers of Europe are complaining of the increased prices resulting from these altered conditions. Nearly all classes of cereals and of meat and other provisions, which used to be received in increasing quantities from the United States have been raised in value, and consumers are beginning to ask whether the British colonies and South American countries cannot come to their assistance. There is every encouragement, therefore, for the cattle and wheat growers of Australasia, Canada and of the River Plate to extend their production and to obtain a share of the higher prices now prevailing in the markets of Europe. Europe under present circumstances is able to take all that these countries can send, whether in the shape of live cattle or frozen meat, as well as in cereals and cotton. The last-named commodity is the source of much anxiety to the Lancashire cotton manufacturer, who finds that he is almost entirely dependent upon the United States for this indispensable commodity. He is, therefore, anxious to buy from other countries and to encourage the growth and development of the cotton trade in South America. This is a condition of things which has not existed for more than a generation, and it opens up a vista of prosperity for our colonies and for South American countries, which until now was supposed to belong only to the North American republic."

NAVAL SHIP BUILDING PROGRAM.

The naval board of construction has recommended to the secretary of the navy that the ship building program to be submitted to congress shall provide for the construction of two battleships, similar to the Connecticut and Louisiana; two armored cruisers, similar to the Tennessee and Washington, and two light-draught gunboats, similar to the Marietta. This is a repetition of the program for this year which was adopted by congress. The general board of the navy is also engaged in considering a ship building program which, it is expected, will be more ambitious than that of the board of construction.

The torpedo boat destroyer Stewart had a successful trial for the standardization of her screws over the measured mile course in Narragansett bay under the supervision of the naval inspection board, of which Capt. Charles T. Train is president, last week. The contract speed of the boat is 28 knots, and on the run a speed of 29.7 knots was reached. This vessel is a product of the Gas Engine & Power Co., and Charles L. Seabury & Co., consolidated, Morris Heights, N. Y.

NO SHIPS FOR STEEL CORPORATION JUST NOW.

The story sent out from Chicago, two or three days ago, to the effect that the American Ship Building Co. (consolidated lake yards) is to build $10,000,000 worth of ships—steel steamers of about 9,000 tons capacity each—for the United States Steel Corporation is to say the least premature. Ships of this kind will probably be built for the Steel Corporation, but they are a matter of the future—the remote future. The Chicago report was very probably built up from the single fact that Mr. A. B. Wolvin and other officials within the Steel Corporation, who have to do with lake transportation, recently requested the ship building company to submit designs of a vessel of very much larger capacity than any craft now engaged in lake service, a steamer of about 550 ft. length and to carry about 9,000 gross tons on 18-ft. draught. Designs for such a vessel have been made and its construction may possibly be undertaken in some one of the lake yards within the coming year. This one vessel would be built, however, simply for the purpose of enabling the Steel Corporation to determine its policy as to new vessels when it is decided to make additions to the present large fleet. Vessel owners will readily understand how much easier it would be for the big steel organization, with control of docks for both the loading and unloading of iron ore, to suit conditions to the operation of 9,000-ton ships than it would be for the individual owners or smaller steel concerns to undertake such a radical departure. But even the one experimental ship of the 9,000-ton kind is still under consideration, with no immediate prospects of an order for it. These are facts, gained through official sources, regarding the present position of the Steel Corporation from a ship building standpoint. It may be stated also, on the best of authority, that the Steel Corporation is sold out for 1903 in practically all its varied line of manufacture, and especially in the kind of material that is used in ships, so that from that standpoint alone there would be serious objection to providing steel for new vessels.

All this relates, of course, to present conditions. The story of millions to go into new vessels is dismissed now, but vessel men of the lakes are not blind to the fact that the interests of the corporation demand the lowest possible carrying charges and that bottom freights will be sought in time of competition and low prices for manufactured products more so than under the highly prosperous conditions that have prevailed for two or three years past. It is generally agreed that when the very high charges that now prevail for material and labor are reduced, when a lower range of prices is reached all around, this great industrial concern will build ships, or possibly buy them cheaper than they can be built. The question often asked, as to why they have not been building vessels during the past two or three years instead of allowing the smaller interests to fill up the ship yards is very easily answered. They have not been in need of vessels to control the freight situation. They have found it quite easy to dictate freights with the fleet of about 110 vessels which they acquired by combination. Why should they build more at big prices when money could be used to much better advantage in the manufacturing end of their business.

The power of the Steel Corporation in freight matters and the probability that its influence in times of depression will be even greater than it is at present is, of course, a matter of interesting discussion all the time in vessel circles. A combination of independent vessel interests is even now talked of—not a pool or an agreement on rates but the outright ownership of all the large freighters that are not controlled by railroads or iron mining interests. J. C. Gilchrist of Cleveland, makes no secret of having given considerable thought to this subject. His undertakings in vessel matters have been very large and he is probably in better position to work out such a combination than any vessel owner has ever been on the lakes, but the best judges in the business say it can not be done. There are too many interests associated with the ownership of the vessels, they say, to permit of such a combination. Mr. W. L. Brown of the ship building company, is said to have given investigation to the subject on two or three occasions, having been urged to do so by eastern capitalists, but gave it up as impractical, mainly on account of the high prices that would be demanded for the vessels by those who have important interests surrounding the operation of the ships.

STATUS OF THE CANADIAN WATER ROUTE.

Buffalo, Oct. 28.—The status and outlook of the Canadian water route, that has always been a rival of our own as far as possible, is always a matter of vital interest to every branch of the marine business, and when anybody who had made his money in this port or largely so, went to developing the rival route in any way, there were always people to say unpleasant things of him. It is always well, though, for the Canadian route to seem flourishing, as it spurs us up to doing things to hold up our side of the business. For this or some other reason a Buffalo marine man lately made the entire tour of the Canadian route prospective all the way from Montreal to Winnipeg. He was greatly impressed with the possibilities of the Ottawa as a stream easily made navigable, but there is too much difficulty with the French river for much to come of it right away. Much will depend on the future course of J. Israel Tarte. He has been getting some hard raps in the Canadian government and should he retire permanently from the public service before long it is felt that Canadian rivalry would get a bad blow, for he was always a great and successful advocate of waterways.

Montreal is building two elevators, one of which, located on the Conners' site, will be a very fine structure, especially as it has the coast distributing appliances, so that grain can be handled several blocks away from the building if necessary. Elevator construction at Fort William and Port Arthur is large just now, but the work drags badly. Men are not to be had in anything like the number wanted, though wages are high. The handicap at that point is the stiff charge for grain. The elevation is a half cent and there is a half cent besides for every month.

The Canadian Pacific is in no position to carry freight in quantity east of Fort William and will not be for a considerable time, though the day will no doubt arrive when the grades will be cut down and a good all-rail business east will be done. So it will be necessary to fill in this gap in the route with a lake line for a considerable time, and so long as this route charges but a quarter of a cent less than from Duluth to Buffalo it is not very likely to rob us right away.

There is a good amount of activity in the Winnipeg district, though the elevator building is nearly all in small towns that are tributory to that center. These houses are going up by the dozen. Sometime ago the Minnesota millers, despairing of getting the privilege of bringing in wheat from the Canadian Red river valley and westward, and milling it in their own country, located in Winnipeg, wholly or by branch, and are agitating the question of milling in transit, which will build up a great rival milling center over there if it succeeds, though whether the flour will find its way to Port Arthur or Duluth is a problem, probably. Still it seems that the Canadian Pacific is likely to double track its line from Winnipeg to Port Arthur before long in the interest of this possible traffic.

Not a word was said in this connection of the Welland canal route as a rival of the Buffalo-New York route. It seems to be the general idea that it is not possible for that to become formidable and if it ever is the new Erie canal route will easily be able to maintain a big lead over it. We have never feared the Welland route. It has always been so unfortunate as to take a step forward by way of deepening its channel just when it was too late to profit by it. Improvements in water routes have gone forward so fast of late that it is impossible to keep a route like that abreast of them unless monstrous resources are brought to bear on it.

It seems now that New York state is preparing to employ these monstrous resources in the further development of our own route and when this work is done it will be out of the question to rival it unless Canada is able to build a fairly deep canal on the Lake Nipissing route. This we have reason to fear, should it ever become a fact, but the chances of this are small, as it would fairly bankrupt Canada to build such a canal and even then the canal would be nothing more than one short route, badly handicapped by ice and the terrors of the lower St. Lawrence. We should still have the other and better one.

While the new Erie canal advocacy is now chiefly on lines dealing with state development and state control of freight charges within her borders, it is not forgotten that the traffic of the lakes is a great factor that must be held along with home advantages. So the new canal meets a double want and is thus doubly needed.

JOHN CHAMBERLIN.

The Polson Iron Works, Toronto, has been awarded contract for the two lightships which are to be placed in the gulf of St. Lawrence by the Dominion government. The contract price is $250,000.

D. G. Kerr E. C. Collins W. J. Olcott A. B. Wolvin C. D. Fraser
D. M. Clemson James Gailey T. F Cole F. E. House

STEEL CORPORATION OFFICIALS—MANAGERS OF ORE AND TRANSPORTATION INTERESTS.

Mr. Gayley is first vice-president of the Steel Corporation; Mr. Clemson, president of Pittsburg Steamship Co.; Mr. Cole, president of Oliver Iron Mining Co.; Mr. Wolvin, vice-president and general manager of Pittsburg Steamship Co.; Mr. Collins, general agent at Cleveland of Pittsburg Steamship Co.; Mr. Olcott, general manager of mines; Mr. House, president Duluth & Iron Range Ry.; Mr. Fraser, secretary Oliver Iron Mining Co.; Mr. Kerr, ore agent, Pittsburg.

NEWS NOTES FROM THE HEAD OF THE LAKES.

Duluth, Minn., Oct. 29.—The new Anchor line package freighter Muncy arrived at the head of the lakes Saturday and took a first load of ore, in order to try her out. She will be in the flour trade hereafter. The new Moses Taylor, of the Mitchell fleet, also arrived and took on her first ore cargo.

Wheat is not coming forward as fast to the Canadian head of the lake ports, Port Arthur and Fort William, as has been hoped by the shippers, and it is doubtful if more than 7,000,000 bu. more can be moved thereto before the close of navigation. So far on this crop these two ports have received 4,000,000 bu. It was expected that fully 20,000,000 bu. would be handled out of western Canada via these ports this fall. The trouble is not alone with rolling stock but with terminal elevator facilities as well.

The schooner J. Godfrey was detained for several days the last week at the Great Northern ore docks, most of her crew having deserted on account, they claimed, of overloading the ship. The schooner was pretty well down to the water line. All reference to the Godfrey aside, it is a notorious fact that many of the smaller vessels, built for less draught than is now possible, have been overloaded, and that more serious and more frequent disasters have not taken place is somewhat remarkable. When a boat built for 16 ft. of water is loaded to 19 ft. something is very liable to occur if weather conditions are favorable for it. The Godfrey was lightened before she sailed. Thirty-two ships arrived at this harbor during the twenty-four hours ending with midnight of the 25th inst. This is said to be the record.

SHIPMENTS OF CANADIAN GRAIN.

Inspector Horn has issued a statement showing the shipments of Canadian grain and its destination from Fort William and Port Arthur, Ont., for the crop of 1901, from Sept. 1, 1901, to Sept. 1, 1902. The statement shows a total of 29,754,574 bu of wheat shipped between those months, 1,085,555 of oats, 52,185 of barley, 10,726 of flax. This gives a total of 30,903,040 bu. of grain. The statement is as follows:

Destination.	Wheat, bu.	Oats, bu.	Barley bu.
Owen Sound	1,468,652	104,341	
Midland	5,647,852	101,047	16,152
Meaford	543,351	107,000	
Depot Harbor	2,590,268	43,903	
Point Edward	470,677	4,495	
Goderich	2,032,269	77,944	
Kingston	5,446,533	108,522	
Buffalo	9,501,737		
Port Huron	884,747		
Detroit	198,000		
Total	28,784,091	547,255	16,152
By rail to stations east	970,483	538,300	36,303
Total, bushels	29,754,574	1,085,555	52,185

Of the 29,347,498 bu. of wheat, oats and barley thus shipped by water, 10,584,484 bu. or 36 per cent., went to American lake ports and 18,630,141 bu., or 64 per cent. to Canadian ports. Nothing but wheat went to the United States ports, the barley and oats all going to Canadian ports. The quantity carried eastward by rail from Port Arthur or Fort William was only 1,545,086 bu., equal to about 5 per cent.

The International Longshoremen, Marine & Transport Workers' Association has issued a charter to the licensed tugmen at Manistee, Mich. This is the forty-seventh charter issued since the convention in Chicago last July. The association numbers upwards of 130,000 men. The first charter issued after the convention was to the general longshoremen's union at Galveston, Tex., with a membership of 310. The association has two other locals in Galveston, the Southern Pacific Transport Workers, numbering 1,700 men and said to be the largest local in the world, and the Cotton Screwers' union with 390 members.

DISCOVERY OF IRON IN MINNESOTA

By Dwight E Woodbridge.

Duluth, Minn., Oct. 25.—Geo. R. Stuntz, who died in Duluth, Oct. 24, at the age of eighty-two years, was really the discoverer of iron ore in Minnesota, and has, therefore, much credit for advancing the material resources of the state, which now leads all political divisions of this country in its output of ore, and is surpassed by but two of the great nations of the world. Mr. Stuntz died in extreme poverty, never having benefitted to any extent from the immense wealth he was first to find, and living to see fortunes of millions upon millions made through his instrumentality.

In 1852 Mr. Stuntz came to the head of Lake Superior and settled in the new village of Superior. There was no Duluth in those days, but on the west side of what is now Rice's point lived on his homestead a half-breed Scotchman, North Albert Posey. Now Posey's brother, Joe, was a woodsman, a latter-day courier de bois, and he had been all through that region from the head of Lake Superior to the Hudson bay posts on the trail to the Saskatchewan and the upper northwest. These trails, debouching on Lake Superior at old Fort William, had been travelled as main roads for a hundred years or more by the traders, clerks, factors and guides of the two great rival fur companies, the Hudson Bay and the Northwestern. In the course of his travels to the north Joe Posey had crossed Vermillion lake and had seen what he took to be great mineral outcropping on its eastern side. Stuntz knew the Poseys and heard of the find and at once the idea of valuable deposits of iron entered his mind. It was in October, 1865, that Stuntz and Capt. Platt left Superior with two months' supplies and accompanied by Indian canoe men and guides for the lake. In those days the trip to what is now the city of Tower was not a three-hours' ride over the most solidly constructed railway in the United States. It was a trip of weeks. It meant a portage from the fond du lac, the "head of the lake," around the 600-ft. rapids of the St. Louis, a way for nearly 10 miles through bush and over windfalls that had been the original path of the first discoverers of the Mississippi river in the seventeenth century. Embarking on the St. Louis at the upper end of grand rapids, above the site of the city of Cloquet, the canoe clove its silent way for nearly 100 miles up the swift black waters of the St. Louis. Then a portage of 5 miles across to Pike river and a voyage down the northern watershed for 30 miles and the traveller reached the southern arm of Vermillion lake. It is a curious fact, and one affording interesting reflections, that the portage these pioneer explorers made in crossing the watershed is known to be just where the Biwabik and neighboring mines now are.

Arriving at Vermillion lake the party found that the Indian trader there was absent and that his post was under charge of one Capt. Simonds, who endeavored to arouse the suspicions of the Indians against the newcomers. Stuntz and his companion were in great dread but finally lay down for sleep in the trading post with a little American flag stuck on a stick at their heads, calling upon the assembled reds and the treacherous Simonds all the wrath of the great father should they be molested. "Needless to say," says Stuntz, "we were not troubled that night."

The next day, after various maneuvers done to throw the jealous and watchful Simonds off the trail, they reached a small bay, west of what is now Stuntz bay, and proceeded through the country to look for the mountain of iron that Posey had told them of. They did not have to go far; they soon found the spot, which for years was called the "Lee mine" and was for years operated by the Minnesota Iron Co. under one of the large open pits. Later in the same day, while wandering alone, Stuntz found what was afterwards known as the "Breitung" pit, and from which an immense amount of ore has been taken.

The party spent two weeks around this part of Vermillion lake, going as far east as the northeast end of the lake, where was what was known as the Pete Armstrong claim, and which has since been explored for ore under the name of the Armstrong mine. This is about 6 miles from the main finds. In November, with 60 lbs. of iron ore knocked off with sledges, the party took its way back to civilization, reaching Superior after a long tramp. The rivers had all frozen and a canoe could not be forced down. They shouldered their supplies and the bag of samples and tramped it for 60 miles through unbroken primeval forest, a job of no small proportions, dangers and difficulties.

Museum specimens of beautiful specular hematite were in the possession of and were distributed by the Smithsonian institution as early as 1867. They had come from Minnesota, but it had not been known how these were brought out. They were the 60 lbs. of ore packed on their backs by the Stuntz party in November, 1865. The year before they had been sent by the institution, to the Paris exhibition, where they created much interest on account of their remarkable purity and beauty.

There was then, by the way, a gold excitement in that region, and Stuntz, in going north in the fall of 1865, passed on the way a number of prospectors bound for Vermillion lake and looking for gold. Among these was the then state geologist, H. H. Eames, now dead, Henry Mayhew, now living on the north shore of Lake Superior at Grand Marais, and J. J. Hibbard, now a resident of Duluth. The following year Stuntz went again to the lake, partly for gold, partly to interest capitalists in the iron he had found. But all efforts to so interest them were futile, as they considered the distance too great and the cost of building railways to be overwhelming, as it was. The country was terrible for railway construction, as your present correspondent knows, having been employed as a young transitman on the original Duluth & Iron Range road, which was completed to the lake in 1884.

Nothing was done in the matter of these iron ores until 1875 when Stuntz succeeded in interesting W. W. Spalding, then of Ontonagon, later of Duluth and now dead, and Geo. C. Stone, then a Dulutn banker. These men took with them Prof. A. H. Chester, the first competent geologist who had ever visited that country in search of iron. He was professor of geology in Hamilton college. These men went in primarily to examine what had been reported to Spalding as immense iron ore deposits south and east of Vermillion lake, in what are now townships 60-12 and 60-13. It may be noted in passing that this was the first examination for iron ore ever made upon the Mesabi range, and the fact that it was made upon a part of that range that has so far proved of no economic value does not militate against the enterprise of these early discoverers. Stuntz endeavored to lead Chester to his former finds upon the Vermillion lake, but the latter was skeptical. He did, however, furnish Stuntz two Indians and a keg of powder, and agreed that if they could bring out as good specimens as Stuntz claimed and taken within 1,200 ft. of his original locations, he would visit the lake. Stuntz took John Mallman, still an explorer at Duluth, and went down Pike river to Vermillion lake and his former finds. Tney had a few tools and some supplies. Stuntz soon found ore at the required distance and commenced drilling. He had a 48-in. drill and it took them many days to make three holes 42 in. deep, for all their blacksmithing was done at the trading post, 5 or 6 miles away. Finally they filled their three holes with about 8 in. of powder and shot them, making the first blast in the history of iron mining in Minnesota. This was in midsummer, 1875. These holes were about 3 ft. from the south edge of the formation and several feet apart. When fired they made merely a crack some 40 ft. long and ½ in. wide. There was not enough powder left for another such blast and the only thing to be done was to work with wedges to loosen off the ledge. They broke and dug away for a width of several feet the perpendicular side of the formation. With ash wedges, smeared with soap, they widened this until it was considered safe to insert all their remaining powder, well mixed with sand to give it bulk. The resulting blast broke off about 60 tons of ore and exposed the vein for a width of 13 ft. The ore, as was afterwards found, ran from 65 to 66 per cent. in iron and was of Bessemer quality.

One of the Indians was at once sent down to Prof. Chester where he and his party was at work on the Mesabi. He arrived in due time and was astonished at the result. Said he: "Why, with three men you have opened more ore than I have found down there with twenty-two men." Although this excellent showing was then made, and although Stuntz called Chester's attention to the find further east at what became the Breitung pit, the parties backing Chester were so discouraged at the poor showing on the other range that nothing was done. The Vermillion was not to be opened then.

It was five years later, in 1880, that Geo. C. Stone succeeded in interesting Charlemagne Tower, sr., father of the present United States minister to Germany, Messrs. Munson and others in these finds and in getting a second report from Chester, at their request. Tower immediately took hold with vigor. Stuntz was employed to survey the township 62-15 and did so in the summer of 1880. Sioux scrip was laid on the land, or part of it, and Chester, Stuntz and about twenty helpers began the first real development of the land now embraced in the Minnesota mine. They dug a series of trenches across the formation, from what was later known as the Stuntz to the Breitung shaft and collectively made what was at that time probably one of the greatest surface showings ever known in an iron ore location. In the following year Breitung and his Marquette associates became interested with Tower, through the report of one Wright, an expert from that district, and the following year the construction of the Duluth & Iron road was begun.

Stuntz remained in charge of the work there till 1883, when he was succeeded by John Armstrong, who in turn was followed by E. Morcom, still a resident of Tower, and who gave way to D. H. Bacon in 1887. Mr. Bacon remained in charge of the affairs of the Minnesota Iron Co. until it had become a vast concern with mines and operations on the Vermillion, Mesabi and Menominee ranges, and left it to take the management of the Tennessee Coal, Iron & Railway Co., two years ago.

In the past few years I have never ceased to wonder at the energy and optimism, the temerity perhaps, of Mr. Tower and his friends in undertaking the construction of the Duluth & Iron Range road. It was through a terrible country, barren, steep, rocky, broken and bewildering; through a region without supplies, means, roads or people, with not one ounce of traffic in sight other than what could be expected by the single undeveloped mine they then knew to exist there, but of whose extent and tonnage they knew actually nothing, and with that mine lying 60 miles away from the harbor, as the crow flew. Had there been no more iron in that region than they knew of the enterprise would have been a miserable failure. Last year the original Minnesota mine shipped only about 4 per cent. of the ore

sent down the Duluth & Iron Range road—200,000 tons out of a total of more than 5,000,000 tons. Had there risen no mines around Ely on the Vermillion, or had the western Mesabi proved as barren as the territory where Messrs. Chester and Stone prospected in 1875, Minnesota would today cut a sorry figure in iron, and the center of steel making might be a long ways from Pittsburg. But their faith and energy were rewarded far better than they hoped for, and no one should envy either these notable pioneers or their successors the rich reward they have secured.

HISTORY OF THE ERIE CANAL.

At the present time the state of New York maintains and operates a system of canals that, including feeders and river improvements, aggregates a total of 638 miles of navigable waterways. These canals are: Erie, Champlain, Black River and Cayuga and Seneca. Of these the Erie is the most important, connecting the Hudson river at Albany with Lake Erie at Buffalo. The Champlain connects Lake Champlain at Whitehall with the Hudson river at Waterford. The Oswego canal connects Lake Ontario at Oswego with the Erie canal at Syracuse. As originally constructed the Erie canal was 363 miles in length, 40 ft. wide at the surface and 28 ft. at the bottom, with a depth of 4 ft. It accommodated boats 78 ft. 4 in. in length, 14 ft. 4 in. in width, drawing 3½ ft. of water and carrying 75 tons of cargo. In 1835 the legislature authorized its enlargement which was begun in 1836 and completed in 1862. The dimensions of the canal after its enlargement were: Length, 352 miles; surface width, 70 ft; bottom width, 56 ft; depth, 7 ft; capable of accommodating boats 98 ft. in length, 17.5 ft. beam, drawing 6 ft. of water and carrying about 250 tons of cargo. The locks of this canal are seventy-two (pairs) in number, 110 by 18 ft., one tier of which, except at Cohoes, Little Falls, Newark and Lockport, consists of double-length locks and permits the passage of two boats at one lockage. An improvement to this canal was authorized in 1895 and was partially completed. This improvement contemplated the lengthening of all the unlengthened locks, the deepening of the prism of the canal to 9 ft., except over permanent structures, where the depth was to have been 8 ft. The cost of the original construction of the Erie canal was $7,143,789, the cost of its enlargement was $44,465,414, and under the act of 1895 there was expended upon the canal $5,833,390.37.

The plan of enlarging the canal to 1,000-ton barge capacity, upon which all canal men are now agreed, was originally proposed by Maj. Thomas W. Symons, corps of engineers, U. S. A., of Buffalo. In 1896 congress passed a resolution asking for a report as to what extent the locks of the Erie canal would have to be enlarged to admit of the passage of torpedo boats from the ocean to the lakes. Any member of congress could easily have secured that information for himself by merely consulting a New York Red Book and the reports of the secretary of the navy giving the dimensions of torpedo boats, but congress does not do business in so simple a manner as that. The resolution of inquiry was referred to Maj. Symons, with directions to make a report. The report stated, of course, that the canal, as the state was then enlarging it, would admit the passage of torpedo boats, but Maj. Symons added conscientiously a general report on the condition and needs of the Erie canal, in which he urged the advisability of enlarging it to 1,000-ton capacity. The report fell on deaf ears at Washington, just as De Witt Clinton's earlier request for federal aid did, but the grasp of the subject shown by Maj. Symons led to a request that the war department permit him to serve on the canal commission appointed by Gov. Roosevelt in 1898 to examine the general question of canal enlargement. That commission, as is well known, recommended Maj. Symons's plan as the most desirable. Appended to its report was a careful estimate made by Maj. Symons of the cost of transportation on the proposed barge canal, which is of sufficient interest at the present time to be worth reprinting. It was as follows:

"The great demand on the part of many people in the state for a much larger canal with widened and deepened locks and a prism to correspond, which would furnish transportation at a minimum cost, influenced the canal committee to make as thorough an examination as possible into the cost of such an improvement and the benefits derivable therefrom. After giving due consideration to every feature of the problem, the canal committee decided that if the canal be materially enlarged its new dimensions should be such as would fit it for use by barges of 150 ft. length, 25 ft. width and 10-ft. draught of water, with all locks arranged to take in two boats coupled together tandem. The route deemed most desirable for such a canal from Lake Erie to the Hudson river is to follow the present line of the Erie canal, with minor diversions from Buffalo to just east of Clyde, then to deflect into Seneca river and follow down this river and up Oneida river through Oneida lake and by the valley of Wood creek to the line of the Erie canal near New London. The two aqueducts across the Mohawk would also be done away with and the canal thrown into the river, and at the west Troy side cut the location would be changed to better the debouchment into the Hudson. This canal would require the rebuilding of all the locks on the portion of the Erie canal retained, substituting at Cohoes, Lockport and possibly at Newark pneumatic or other mechanical locks for those now existing, building new locks on the Seneca-Oneida and lower Mohawk portions of the route and deepening and widening the prism of the canal to give a waterway of not less than 1,000 sq. ft. cross section.

"The following is the estimated cost of transportation by such an enlarged Erie canal:

Load of steamer.....900 tons or 30,000 bu. of wheat.
Load of ordinary barges.....1,000 tons or 33,333 bu. of wheat.
Load of Fleet.....3,900 tons or 130,000 bu. of wheat.

Ten trips annually:—

Total down freight per annum..39,000 tons or 1,300,000 bu. wheat.
Total up freight per annum.....13,000 tons.
Total up and down freight per annum.....52,000 tons.
Total up and down freight in wheat.....1,733,333 bu.
Value of steamer $13,500
Value of three barges..... 15,000

Value of fleet $28,500

SEASON'S EXPENSES.

Wages and subsistence	$ 4,000.00
Fuel, oil, waste, etc.	3,300.00
Ordinary repairs	300.00
Insurance on fleet	352.50
Insurance on down cargo	2,925.00
Miscellaneous small expenses	200.00
Interest on investment, 5 per cent.	1,425.00
Deterioration, etc., 5 per cent.	1,425.00
	$13,927.50

Cost per ton $\frac{\$13,927.50}{52,000}$ equals 26 cents.

Cost per bushel $\frac{\$13,927.50}{1,733,333}$ equals .8 of a cent.

Cost per ton per mile equals .52 of a mill.

"These figures as to the cost of transportation by canals of various capacities, etc., are based upon using four-boat steam fleets, making an estimated number of trips each year, which number is dependent upon the rapidity of transit through the canal and open waterways, the time consumed in lockage, the dispatch at terminals and the liability to accident and detentions. There are various possibilities which may enable the cost of transportation to be still further reduced. Six-boat fleets may be used instead of four-boat fleets; the motor boats may be run independently of the ordinary motorless consorts and all the components of the fleet used to better advantage; and some other better and more economical method of supplying propulsive power may be devised and put into operation. The figures as to cost of transportation are also based upon the idea that the canal transportation will be carried on in a businesslike manner, as nearly as practicable in accordance with modern railroad practice. As the reduction in the cost of transportation would affect not only the canal freight, but rail freight as well, it is certain that the gross tonnage benefitted would vastly exceed 10,000,000 per annum, and the benefits to the producing, manufacturing and business interests of the state and country would be several times the largest amount stated in the appended table."

TARTE HAS RESIGNED.

The expected has happened in Canada. Sir Wilfred Laurier, premier, has demanded the resignation of the Hon. J. Israel Tarte, Minister of public works. "If I were the prime minister," said sturdy old Dr. Sam Johnson, "and anyone so much as wagged his finger at me I'd have his head." During the premier's absence in England the minister of public works came out strongly for protection and made several speeches to that effect. Sir Wilfred held that the minister's action constituted a self-evident violation of his duty towards the government of which he was a member. "If," wrote he to Mr. Tarte, "you had reached the conclusion that the interest of the country demanded, without delay, an increase of the customs duties, the first thing for you to do as a member of the government, before addressing your views to the public, would have been to place them before your colleagues with the object of obtaining that unanimous action of the cabinet which is the very foundation of responsible government. If you had not been able to obtain from your colleagues their assent to the new course which you recommended, you would have been obliged then to choose either to accept their own views or to sever your connection with them, and then, for the first time, would you have been free to place your views before the public. Such was the very simple course which was binding upon you, but to remain a member of the government, and at the same time to advocate a policy which has not yet been adopted by the government, was an impediment to the constitutional system and implies a disregard for that loyalty which all those who are members of the same administration owe to each other and have a right to expect from each other." Mr. Tarte has accordingly resigned.

AROUND THE GREAT LAKES.

Capital of the Ship Owners' Dry Dock Co. of Chicago, has been increased to $600,000. Improvements in the company's docks are contemplated.

Directors of the Cleveland & Buffalo Transit Co. on Tuesday of this week declared the regular quarterly dividend of 1¼ per cent. It is payable Nov. 1.

Rear Admiral Taylor, chief of the bureau of navigation, has left Washington for a tour of the lake ports in connection with the location of a naval training station.

Beginning Nov 1 the wages of lookouts, watchmen and seamen will be $60 per month, the Pittsburg Steamship Co. and other fleets agreeing to pay the advance for the balance of the season.

The dock of the Boston Coal Dock & Wharf Co. at Duluth, is to be lengthened from 900 ft. to 2,300 ft., increasing its capacity, which is now 200,000 tons, to 500,000 tons. The width of the dock is 300 ft.

The Donnelly Contracting Co. of Buffalo,, has been awarded the contract to complete the breakwater at Conneaut on its bid of $438,000. This company is also doing breakwater work at Ashtabula and Fairport.

Plans for a grain elevator with a capacity of 650,000 bu., have been completed for the Lackawanna Milling & Elevating Co. of Scranton, which is about to locate at Buffalo. The company has also leased the International elevator at Black Rock.

General Passenger Agent Herman, of the Cleveland & Buffalo Transit Co., is out with a neat card reminding the passenger and ticket agents of railways all over the country that the staunch and elegant steamers of his line will be kept on the route between Cleveland and Buffalo until Dec 1.

Capt. Nicholas White, for many years a lake sailor, died at his home in Detroit quite suddenly last Sunday. Capt. White sailed from the port of Buffalo for many years. He was first mate of the Gov. Cushing when she blew up, and his escape from death at that time was accounted miraculous.

It is announced from Duluth that the Buffalo & Susquehanna Mining Co. has taken a lease of a new iron ore property at Hibbing, paying for it a bonus of $300,000. The property is said to have a deposit of 15,000,000 tons. The company purchasing this property is one of the new Buffalo steel concerns.

At the annual meeting of the stockholders of the consolidated Lake Superior Co., which was held at New Haven, Conn., on Monday, the following directors were chosen: Edward J. Berwind, Charles E. Orvis, New York; F. H. Clergue, Sault Ste. Marie, Ont.; Lynde Harrison, New Haven; H. A. Berwind, E. V. Douglass, W. P. Douglass, Samuel Rea, Edward C. Lee, F. S. Lewis, George Philler, S. M. Prevost, T. C. Search and James S. Swartz, all of Philadelphia.

It is understood that the Lake Carriers' Association will ask congress for an appropriation of $50,000 with which to adequately celebrate the semi-centennial anniversary of the breaking of ground for the construction of the first canal at Sault Ste. Marie, Mich., which occurs on June 4 next. It is likely that the association will take an active part in the proposed celebration. The association will place a plate on the gates of the Poe lock, suitably inscribed in memory of Gen. Poe.

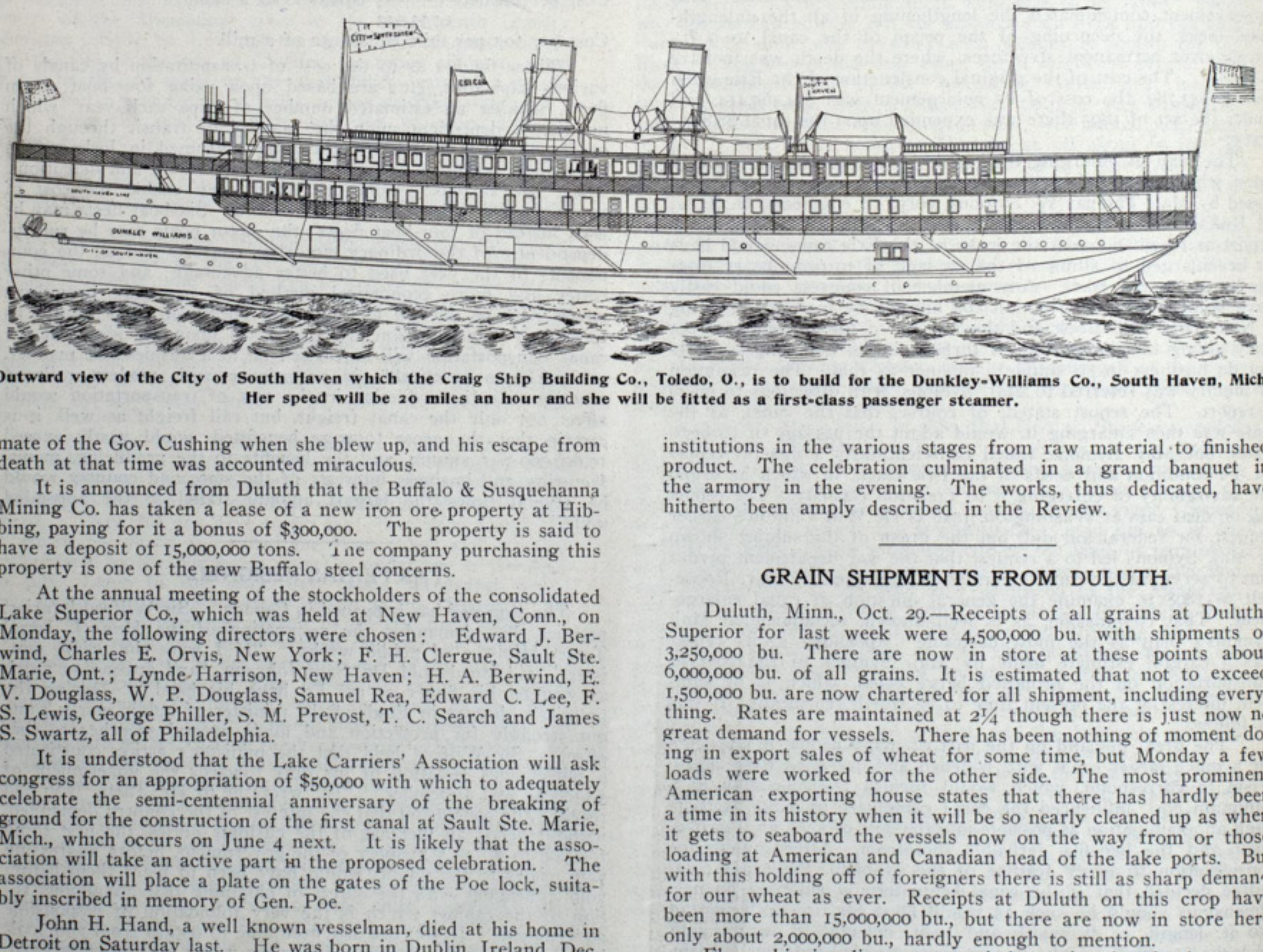
John H. Hand, a well known vesselman, died at his home in Detroit on Saturday last. He was born in Dublin, Ireland, Dec. 6, 1836, going to Detroit with his parents when a child. Later the family removed to Port Huron where his father established a tannery. As soon as young Hand was old enough he went on the lakes as an engineer, later becoming chief engineer of the old Brockway Line. Leaving this company he was connected with the Northwestern Transportation Co. for fifteen years, resigning in 1899 on account of ill health.

The old gunboat Michigan has been during the past week searching Lake Erie in an endeavor to locate the wrecks of the Barr, Stevens and Lockwood. The Barr and Stevens appear to have been located and marked, but it seems that the Michigan failed to find the Lockwood. Upon hearing this the war department ordered Maj. Dan C. Kingman, in charge of the Cleveland district, to send out a vessel to look for the Lockwood, and find her, if possible. Maj. Kingman has accordingly ordered out the Visitor, the engineer vessel of the Cleveland district.

The gas buoy that marks Black river shoal in the middle ground off Black river in St Clair river has been moved to a point 600 ft. to the northward and 600 ft. eastward, thus bringing the channel close to the Canadian shore and making it about 900 ft. wide. The spot is considered a dangerous one by vesselmen, several large boats having already grounded there, and the United States authorities will be urged to have it dredged as soon as practicable. Vesselmen are advised to navigate with extreme caution, as the channel has been narrowed about 600 ft.

A series of lectures will be given upon practical and theoretical navigation by Lieut. W. H. Faust, of the Buffalo hydrographic office at No. 1,344 Prudential building, during the coming winter. Lieut. Faust requests that everyone who expects to attend the first lecture send his name and address to him and to suggest points and subjects for discussion at all the lectures. Lieut. Faust says that the object of the lectures is to bring the hydrographic office to the attention of vessel men generally and to foster a co-operation in the work for which the office was established. The lectures will be free.

Water was turned into the new power canal of the Consolidated Lake Superior Co. at Sault Ste. Marie, Mich., on Saturday last at noon. Miss Helen Clergue, sister of Francis H. Clergue, organizer and general manager of the company, turned a jeweled switch that started the wheels in the big power house. The first power thus generated was used to run one of the company's new electric street cars. A civic and military parade marched through the streets in the morning that exceeded anything ever before seen in upper Michigan. Over 10,000 men were in line. In the afternoon an industrial parade was given which showed the different products of the Clergue institutions in the various stages from raw material to finished product. The celebration culminated in a grand banquet in the armory in the evening. The works, thus dedicated, have hitherto been amply described in the Review.



Outward view of the City of South Haven which the Craig Ship Building Co., Toledo, O., is to build for the Dunkley-Williams Co., South Haven, Mich. Her speed will be 20 miles an hour and she will be fitted as a first-class passenger steamer.

GRAIN SHIPMENTS FROM DULUTH.

Duluth, Minn., Oct. 29.—Receipts of all grains at Duluth-Superior for last week were 4,500,000 bu. with shipments of 3,250,000 bu. There are now in store at these points about 6,000,000 bu. of all grains. It is estimated that not to exceed 1,500,000 bu. are now chartered for all shipment, including everything. Rates are maintained at 2¼ though there is just now no great demand for vessels. There has been nothing of moment doing in export sales of wheat for some time, but Monday a few loads were worked for the other side. The most prominent American exporting house states that there has hardly been a time in its history when it will be so nearly cleaned up as when it gets to seaboard the vessels now on the way from or those loading at American and Canadian head of the lake ports. But with this holding off of foreigners there is still as sharp demand for our wheat as ever. Receipts at Duluth on this crop have been more than 15,000,000 bu., but there are now in store here only about 2,000,000 bu., hardly enough to mention.

Flour shipping lines are restricting quite sharply the movement from interior milling points. Some of the lines are taking a few cars a day and some are not taking anything, being filled up for what boats they have till well into November. Some of them have been making inquiry for more tonnage to be chartered to the close of navigation and a number of additional ships will be in the flour trade from now on. It is probable that flour shipments now are about 260,000 bbls. weekly, though it is impossible to get any figures of in-transit shipments of flour that are even approximately correct. This estimate is based on returns entirely outside the railway reports and far more correct than they usually are.

OFFICIAL SCHEDULE OF ENGINEERS' WAGES FOR 1903.

All members of the Marine Engineers' Beneficial Association employed on vessels of the great lakes are now being notified by Evans J. Jenkins, second national vice-president and lake business manager, of the action taken by the national officers in Detroit recently regarding wages for 1903. The official schedule is as follows:

STEEL STEAMERS.

First class.—All steel freight steamers of 2,100 tons or over, all steel package freight steamers over 1,800 tons and all passenger steamers over 1,200 tons.

Second class.—All steel freight steamers of 500 to 2,099 tons not included in the first class and all passenger steamers of 300 to 1,199 tons.

Third class.—All steel steamers not included in the first and second classes and all passenger steamers under 300 tons.

Crew list, steel steamers—All first-class steamers having water-tube boilers, or more than three boilers of any kind, to carry three engineers, two oilers and water tenders where required. All first-class steamers not included in foregoing to carry two engineers and two oilers.

All second-class passenger steamers to carry not less than one oiler. All second-class steel steamers of 1,000 to 2,099 tons having water bottoms and auxiliary machinery, which latter would exclude electric light engines, steering engines, capstan engines, steam windlasses, blowing engines, hoisting engines, running shaft line, to carry two engineers and two oilers. All second-class steel steamers of 1,000 to 2,099 tons having water bottoms, steering engine and windlass engine only, to carry two engineers and one oiler.

Wages—Steel Steamers.

		Per month.	Season of ten months
First class—	Chief	$150	$1,500
	First Assistant	100	1,000
	Second Assistant	75	750
Second class—	Chief	125	1,250
	Assistant	90	900
Third class—	Chief	105	1,050
	Assistant	75	750

WOODEN STEAMERS.

First-class in wooden steamers to include all over 1,200 tons and all package freight steamers over 750 tons; second class, all between 600 and 1,199 tons; third class, all between 200 and 599 tons; fourth class, all not included in above.

Crew list.—All first-class over 1,500 tons to carry two engineers and not less than one oiler; all first-class package freight steamers over 1,500 tons, two engineers and two oilers; under 1,500, two engineers and one oiler.

Wages—Wooden Steamers.

		Per month.	Season of ten months
First class—	Chief	$125	$1,250
	Assistant	90	900
Second class—	Chief	114	1,140
	Assistant	84	840
Third class—	Chief	105	1,050
	Assistant	75	750
Fourth class—	Chief	95	950
	Assistant	65	650
Fish tugs—	Large	105	
	Small	90	

Note—The term tons means gross tons in all cases.

END OF THE DREDGING OPERATIONS AT DULUTH.

Duluth, Minn., Oct. 29.—On Nov. 10 or 15 the dredging work that has been in progress in the harbors of Duluth-Superior for the past five years will cease—completed. It is believed to be the largest contract of the kind ever carried out in America, probably in the world. In remarkable contrast to most contract work it ceases practically on time, which was set at the commencement, in 1897, at Nov. 1, 1902. This work has been notable from several points of view. The board of engineers that recommended it, and made estimates upon which the appropriation was based, figured on the cost of similar work here and elsewhere in the past. But so large was the contract and so great was the saving by letting the whole in one lump, that more than $1,000,000 was saved out of the $3,100,000 appropriated, and this has been used for additional harbor work that might never have been done, certainly would not for many years, but for the saving. This additional work was of the highest importance, but the opportunity was taken to make it of a permanent and costly character unusual with work in this country under authorization of congress.

The dredging contract was let in two parts, one portion to E. T. Williams & Co of Duluth, the other to C. S. Barker of Superior, two of the heaviest dredging contractors on the lakes. It was in three sections, the first being for the lower bay, where most of the head of the lake commerce then existed. The contract price for this was 7½ cents a yard. The second section was between the two bridges in St Louis bay, practically all the area between Rice's and Grassy points. This was at 8 cents a yard. Section No. 3 was up-river from Grassy point, as far as the work extended. This was at 10 cents. In all, 2,400,000 cu. yds. of material have been dredged and deposited in the lake, along the shore of Minnesota point, widening it considerably.

The head of the lake harbor now consists of 20 miles of channels, with no less than 22 ft. of water anywhere, and with entrances of 25 ft. depth. At the Duluth entrance there is a large basin ¾ mile long and half as wide, and at the Superior entry there is a triangular basin of about ½ mile each side. There is a third basin as large as that at the Duluth entrance, at what is known as the "gate" at the foot of Rice's point. The main channels are from 300 to 500 ft. in width, according to location. The chief work of this year, done since the issuance of the last harbor chart, has been to take out all shoals in the channels, to cut the Superior entry basin to full size and to complete the upper end of the channel, toward the foot of the St. Louis river rapids.

By the saving of $1,000,000 secured through the continuous contract plan—a plan adopted here, by the way, upon the urgent recommendation of Charles A. Towne, late congressman from this district—much additional work has been possible. This work consisted in part of the construction of the Duluth entrance of a pair of concrete piers, running out into the lake and taking the place of wood piers that had been previously in position. These piers cost $625,000. Then the government bought about $100,000 worth of land on the point, about the piers and elsewhere. There was left $275,000, which will go some ways toward completing the first of a pair of concrete piers to be erected at the Superior entry. These piers are expected to cost about $1,000,000, being twice as long and containing more cement to the foot than the Duluth piers. Authorization and appropriations for the first of these piers have been secured by Capt. D. D. Gallaird, engineer officer in charge, and work commences in the spring. It is expected that the first pier will be completed in 1905, and the pair a year later, providing additional money is secured as needed.

The harbor work at these head of the lake harbors under the continuous contract above described, was commenced by Maj. Clinton B. Sears and continued by Capt. D. D. Gallaird, who has supervision, not only of this work but of all government improvements on Lake Superior.

"What additional work is, in your opinion, necessary for the head of the lake harbors now that this great contract is completed?" was asked Capt. Gallaird the other day.

"I do not know of much," he answered. "We are in constant communication with the vessel men here, through letters and personal interviews, and there has not been a complaint this year as to the dredged area. If anything was much desired I think we should have heard of it. The depths are about 2½ ft. greater than ships can load for the connecting channels of the great lakes. It has been a very wise policy that Maj. Sears entered upon in connection with this work, to be ahead of the requirements of vessels, rather than constantly striving to catch up with them. I have followed this policy. The act under which this work has been done specified that there was to be 20 ft. of navigable depth. I have interpreted this to mean enough water to make navigation at that depth safe and easy. So we have 22 ft. everywhere in the channels. I want to widen the channel below the gate at the foot of Rice's point and take off a corner there, and if this is not asked by next summer I shall ask it and make the necessary recommendations myself. But our commerce has leaped forward by such immense strides that it is impossible to foretell what may be necessary very far ahead and we may find a lot of work pressing upon us here in the near future."

BOOK NOTES.

Theodore Lucas, member of the Society of Naval Architects and Marine Engineers, has prepared a book of questions and answers for marine engineers, accompanied with a practical treatise on breakdowns at sea. The book contains 807 questions with fully explained and illustrated answers, also giving the United States government rules and regulations governing the construction and proportions of marine steam boilers and their accessories. The three things which have influenced the author in preparing the book are these: First, that it should be of use to the student; second, that it should be plain; third, that it should deal mainly with fundamental principles. The simplest division possible of the contents of the book has been adopted—that of question and answer. The advantage of this system is that each paragraph is complete in itself so that a busy man may turn to precisely the information which he wants and acquire it at a glance. The book is for sale by the Marine Review Publishing Co.

The D. Van Ostrand Co. has published in book form the articles on "Worm and Spiral Gearing" by Frederick A. Halsey which were originally printed in the American Machinist. Justification for the republication is found in the still prevalent opinion among designers of machinery that worm gearing is necessarily short lived and of low efficiency, and in the fact that the methods of laying out spiral gearing are not as widely understood as the merit and convenience of that form of gearing make desirable. The theory of worm gearing is well fortified by the collection of facts from experience and it points out clearly the procedure to be followel in order to insure durability and efficiency. Both analytical and graphical methods of laying out spiral gearing are given, and these, it is believed, will meet the needs and tastes of all.

OLDEST STEAMBOAT LINE IN THE UNITED STATES.

It is stated that the steamboat line between Bangor and Boston is the oldest, in point of continuous service, in America, the first steamers having been run in the year 1824, seventeen years after the first practical application of steam to the propulsion of vessels. A year later, in 1825, a queer little craft called the Patent ran between Boston and Portland, and her first arrival at the Maine port caused great excitement. She was built in 1821 at Bedford, Mass., and seventeen hours was considered good time for her to make between Boston and Portland. The Maine, the Legislator and the Waterville came along soon after the Patent, making trips from Boston to various Maine ports, and in 1824 the Connecticut, which was built in New York in 1816 to run between that city and New Haven, came to Bangor. She was of 400 tons, rigged with masts and yards, and had an engine of Fulton pattern, with balance wheel and couplings, by which the engine could be thrown out of connection with the paddles. The Chancellor Livingston, in which Commodore Vanderbilt had an interest, was the next steamer of any importance to be placed on the Boston and Bangor line. She was built in New York in 1816, and was considered to be the masterpiece of Fulton. She had three smokestacks, three masts, a bowsprit and jibboom, and carried a huge square sail on the foremast, with fore-and-aft sails on the main. The Livingston lost money, because she was too much of a boat for the amount of business on the line, and Commodore Vanderbilt soon disposed of his interest, the owners who held on to their shares being eventually ruined. The Victory, the McDonough and the Portland were also among the early boats, but the Bangor, built in New York, was the first new boat, as well as the fastest up to that time, that came to Maine. She was of about 400 tons, well fitted for her time, and did a profitable business, generally carrying about 120 passengers on a trip, at the rate of $6 each, between Bangor and Boston.

The Bangor ran on the route until the fall of 1841, and in 1842 she was taken to the Mediterranean, where for some time she was engaged in carrying pilgrims from Alexandria on their way to Mecca. When she arrived over there, being painted white, not a Mussulman would step foot on her, white being their mourning color, so she was then painted black, and afterward did a flourishing business in the pilgrim trade. The Bangor was purchased by the Sultan of Turkey and added to his navy. Another steamer, the Bangor, a propeller, made a few trips between Boston and Bangor, and was then purchased by the United States government and sent out to take part in the attack on Vera Cruz, where she won lasting fame. She was the first iron steamer built in America.

From 1835 to 1845 numerous steamers ran on the line between Boston and Bangor, including the Charter Oak, Huntress, Sandusky, Express, Portland and Admiral. The Charter Oak was a fine boat, originally intended for the New York and New Haven line, where her owners, Capt. Memnemon Sanford and a Mr. Cunningham, found the competition of Commodore Vanderbilt so sharp that they sent the boat east. Vanderbilt followed them to Maine with the steamer Telegraph and for several years there was such brisk rivalry between the two lines that the fare between Bangor and Boston, which had been as high as $7 was reduced to $1.

In 1845 Capt. Sanford put the steamer Penobscot on the Boston and Bangor route, and that boat, on the night of June 17, 1845, made the first trip to Bangor by what is known as the "outside route," going across directly from Cape Ann to Monegan island, instead of following along the coast as had formerly been done. It was on this occasion, also, that time courses were first used, the method being then adopted by Capt. Sanford for his New York and Philadelphia line, and afterward coming into general use.

The fifteen years preceding the civil war was a harvest time for steamboats on the Penobscot. There was no railroad from the western part of the state to Bangor until 1857, and so the steamboats had all the business. Some famous boats ran between Boston and Bangor in those days, including the Senator, built by Daniel Drew of New York; the Daniel Webster, named for the statesman, a large and handsome steamer, afterward sold to run on the St. Lawrence and renamed the Saguenay; the Governor, T. F. Secor, W. J. Pease and Kennebec. It was on the Kennebec, in August, 1849, that cholera made its first appearance in Bangor.

In 1851 was formed the company which for many years operated what was known as Sanford's Independent Line. Its originator, Capt. Memnemon Sanford, died in New York in the following year, and the business was continued by other members of the Sanford family. During the war nearly all the down east steamboats were chartered by the government for transport service, and some of them, including the Memnemon Sanford, a fine new boat, never came back to Maine. The latter day history of the Boston and Bangor Line began with the coming on the route, in 1863, of the steamer Katahdin, which was joined in 1867 by the Cambridge and in 1882 by the Penobscot. The Katahdin was, in many respects, the most remarkable side-wheel steamer ever produced in the United States, and her fame spread far and wide. She was as good a sea boat as most of the propeller steamers, fast in her day, and followed by the most surprising good fortune. Other boats were wrecked in storms that she went through without the least trouble, and other boats would strike on rocks along the dangerous coast of Maine that the Katahdin always dodged. She never lost a passenger or any freight, and, in short, such was her "luck" that down east people, especially sailor men, came to regard her as bearing a charmed existence. She continued to run between Boston and Bangor, with the exception of a few winters on Long Island Sound, until the summer of 1895, when, the new steamer City of Bangor having come on the route, the old "Kate," as she was familiarly called, was broken up for her metal.

The Cambridge, which was the fastest and most elegantly finished steamer that ever came to Bangor, was lost on Old Man Ledge, on February 10, 1886, by a blunder of her pilot. She was a popular boat, but had more than her share of bad luck, having been ashore several times, and once, when she was brand new, narrowly escaped loss, with all hands.

In the summer of 1901 the Boston & Bangor Steamship Co., which, formed in 1875, had succeeded the Sanfords, sold the line to the Eastern Steamship Co., a corporation organized by Charles W. Morse of New York, and which has also acquired the Kennebec, Portland and International Lines. The business on the Boston and Bangor division is now done by the new side-wheelers City of Bangor and City of Rockland, fine and large boats of their type.

ITEMS OF GENERAL INTEREST.

Mr. Arthur Masters, naval architect, 29 Broadway, New York, has under way six large schooner yachts for New York parties. He is also making plans for two steam yachts for eastern yachtsmen.

A four-masted, wooden schooner, the Samuel W. Hathaway, was launched from the yard of E. & I. K. Stetson, Brewer, Me., a few days ago. She is 181 ft. long, 39½ ft. beam and 19½ ft. deep. She was built for Crowell & Thurlaw of Boston.

In passing it is pertinent to remark that the International Correspondence Schools of Scranton, Pa., must not be confounded with the Correspondence Institute of America, of Scranton, Pa., whose promoters were recently arrested on the charge of fraudulent use of the mails.

The Cramps of Philadelphia, launched last week the new steamer Huron, for the Clyde Steamship Co. The new addition to the Clyde Line fleet is 315 ft. long, 43-ft. beam and 30 ft. deep. The Huron will be employed in the freight service between Boston and Jacksonville. A sister ship of the Huron is now being built at Cramps

President Roosevelt is making a personal inquiry into the value of the different types of ships to be added to the navy. He has consulted Rear Admirals Taylor and Bowles on the disputed question as to whether it is better to have a large number of small battleships or a small number of large ones. Both sides of the question are supported by sound arguments and the president is now seeking the views of experts.

The Marine Iron Works, Chicago, has just completed a yacht for Capt. William Wiess, of Beaumont, Texas. She left on her long journey this week. While the vessel is 100 ft. long and 17-ft. beam her draught is less than 2 ft., or to be exact it is 23 in. She is intended to navigate Texas rivers and lakes and that is the reason for her peculiar construction. She has been christened John H. Kirby and cost $20,000 to build.

W. G. Pollock, Peter Kimberley and other gentlemen of Cleveland and Pittsburg well known in iron and steel circles, have recently purchased a tract of land near Port Arthur, in Canada, on which a very favorable showing in copper has been made. They are close to Port Arthur and only 7 miles from a railway. A mine has been under development for a year past. The Folger brothers of Kingston, are also interested in the property.

Cobb, Butler & Co., Rockland, Me., will launch in a few days the new three-masted schooner. Her dimensions are as follows: Length, 152 ft.; beam, 35 ft.; depth, 13 ft. The schooner is of attractive build with graceful lines and was designed by John J. Wardwell of Rockland. The schooner is equipped with a steam boiler and double drum engine made by the Bath Iron Works, Bath, Me., and a steam windlass manufactured by Knowlton Bros., of Camden, Me.

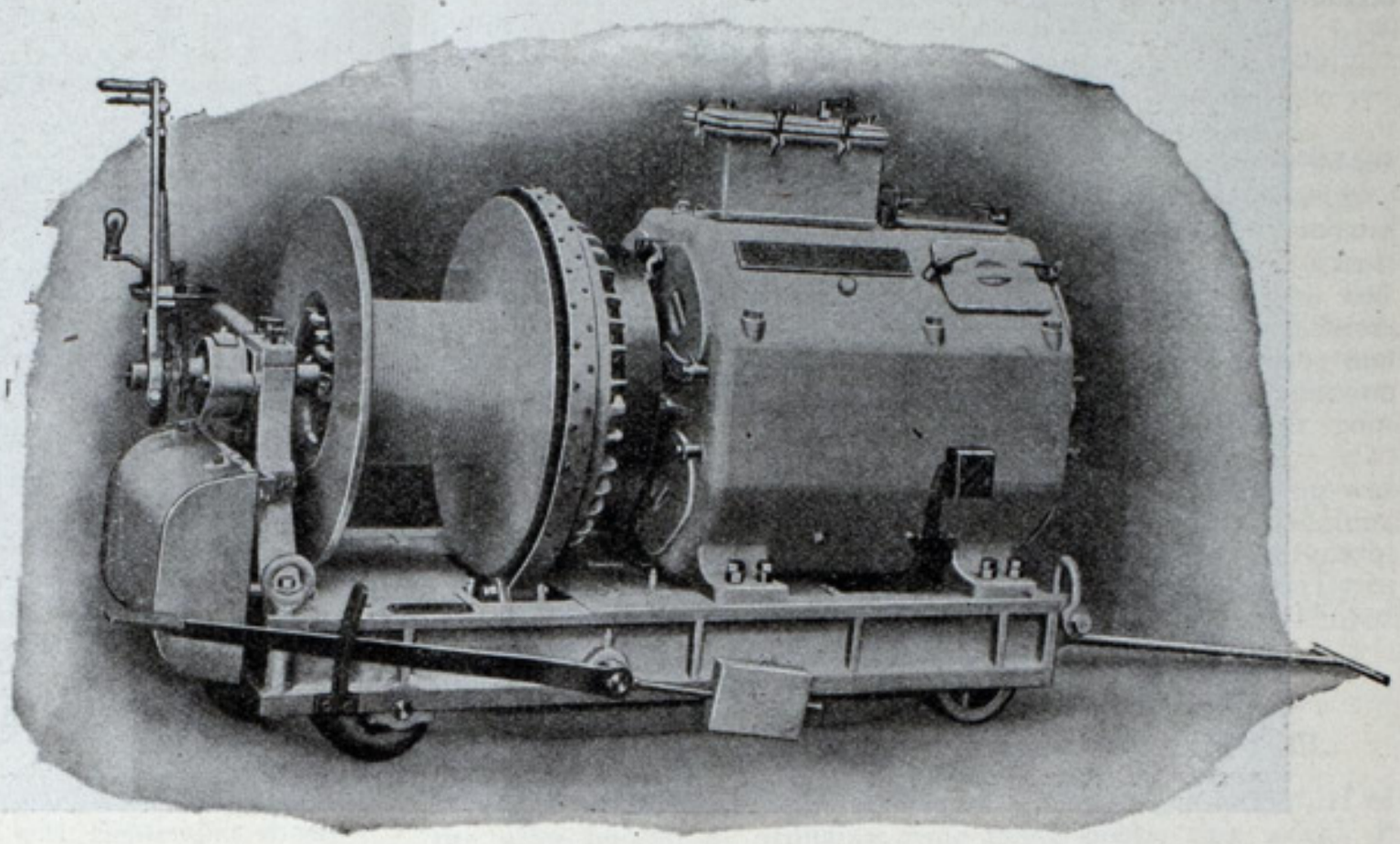
Secretary Moody will shortly decide whether Rear Admiral George Wallace Melville, engineer-in-chief of the navy, shall remain at the head of that bureau or be transferred to the retired list on reaching the statutory age limit on Jan. 10, next. Admiral Melville is anxious to continue and as his qualifications for the office are generally recognized the secretary may disregard precedent and recommend the admiral's re-appointment for a term of four years. The president personally has the highest regard for Admiral Melville's rare abilities.

The Standard Chain Co., of Pittsburg, is contemplating a reduction in its capital from $3,000,000 to $1,500,000 and from present indication it is likely to be made. The properties and plants owned by the Standard Chain Co. are as follows: Baker Chain & Wagon Iron Mfg. Co., Allegheny, Pa.; P. Hayden Saddlery Hardware Co., Columbus, O.; Garland Chain Co., Rankin Station, Pa.; Bower & Mallery, Carlisle, Pa.; Nes Chain Mfg. Co., York, Pa.; John C. Schmidt & Co., York, Pa.; Franz Krein Chain Co., Marion, Ind.; Lebanon Chain Works, Lebanon, Pa.; Falls City Chain Works, Jeffersonville, Ind.; the chain department of the H. P. Nail Works of the American Steel & Wire Co., Cleveland, O.; South Harrison Chain Works, Harrisburg, Pa., and a new plant at Braddock, Pa.

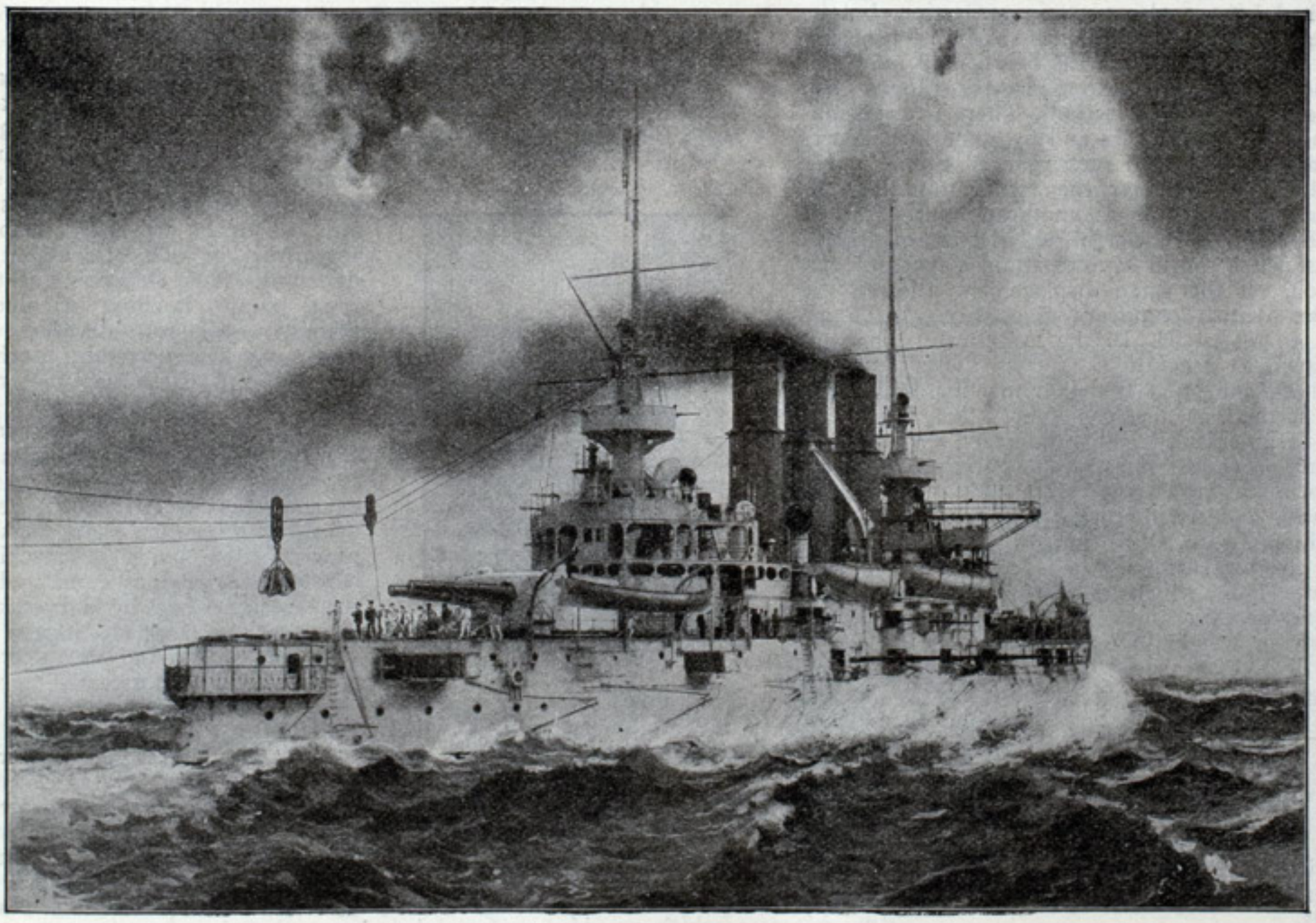
COALING THE BATTLESHIP RETVIZAN AT SEA.

The details have just been received of an interesting test of the Lidgerwood-Miller marine cableway for coaling at sea which was installed earlier in the year on board the Russian battleship Retvizan. The trial took place Sept. 12 in the Baltic sea, near Cronstadt, Russia, under the direction of a board of inspectors appointed by the Russian government, among whom were Admiral Nikowof, chief of testing squadron, and Rear Admiral Virenius, chief of the bureau of navigation. The marine cableway on the Retvizan is operated by two Lidgerwood electric winches which employ the G. E. C. B. 24 electric motor series wound. The slipping drum has a diameter of 14 in. and is mounted on the armature shaft. The balance of the equipment is the same as was installed on the United States battleship Illinois and which has been described in these columns.

In making the test Sept. 12 coal was transferred from the auxiliary cruiser Asia which acted as collier, and was taken in tow by the Retvizan. The entire marine cableway was rigged up in about an hour, which is very quick work. The distance between masts was 400 ft. and the tests began by transferring a load of one bag, 350 lbs. Two bags were then sent across at one time, and the number finally increased to four bags. The four bags held 1,400 lbs. and traversed the distance between the vessel at the rate of one load a minute. This would show an hourly capacity of 37 tons per hour. As the Asia did not have any winches on board, the coal had to be hoisted to the masthead by hand and hence the coal did not come as regularly as it otherwise would. At the time of the trial the vessels were only moving at the rate of 5 knots an hour and the tension on the main cable supporting the load was only about 3 tons. If the speed had been enough greater of a larger sea anchor used to make the tension on the main cable 8 tons, loads of 1 ton could have been transferred in the same time, and with no added effort on behalf of the electric winches.



Lidgerwood Electric Winches, employed for operating Marine Cableway on board the Retvizan.



Russian Battleship Retvizan taking Coal at sea.

Capt. Stchensnovitch, commanding the Retvizan, and who was present at the test, indorses the marine cableway strongly, and in a recent communication to the inventor says: "Witnessing this last success I am sure that your system of coaling at sea will be adopted by all navies of the world." The trial board reached the conclusion "that the marine cableway works entirely satisfactory and is well worth adoption for general use on board war vessels. All details of the apparatus are well worked out, practical and expedient."

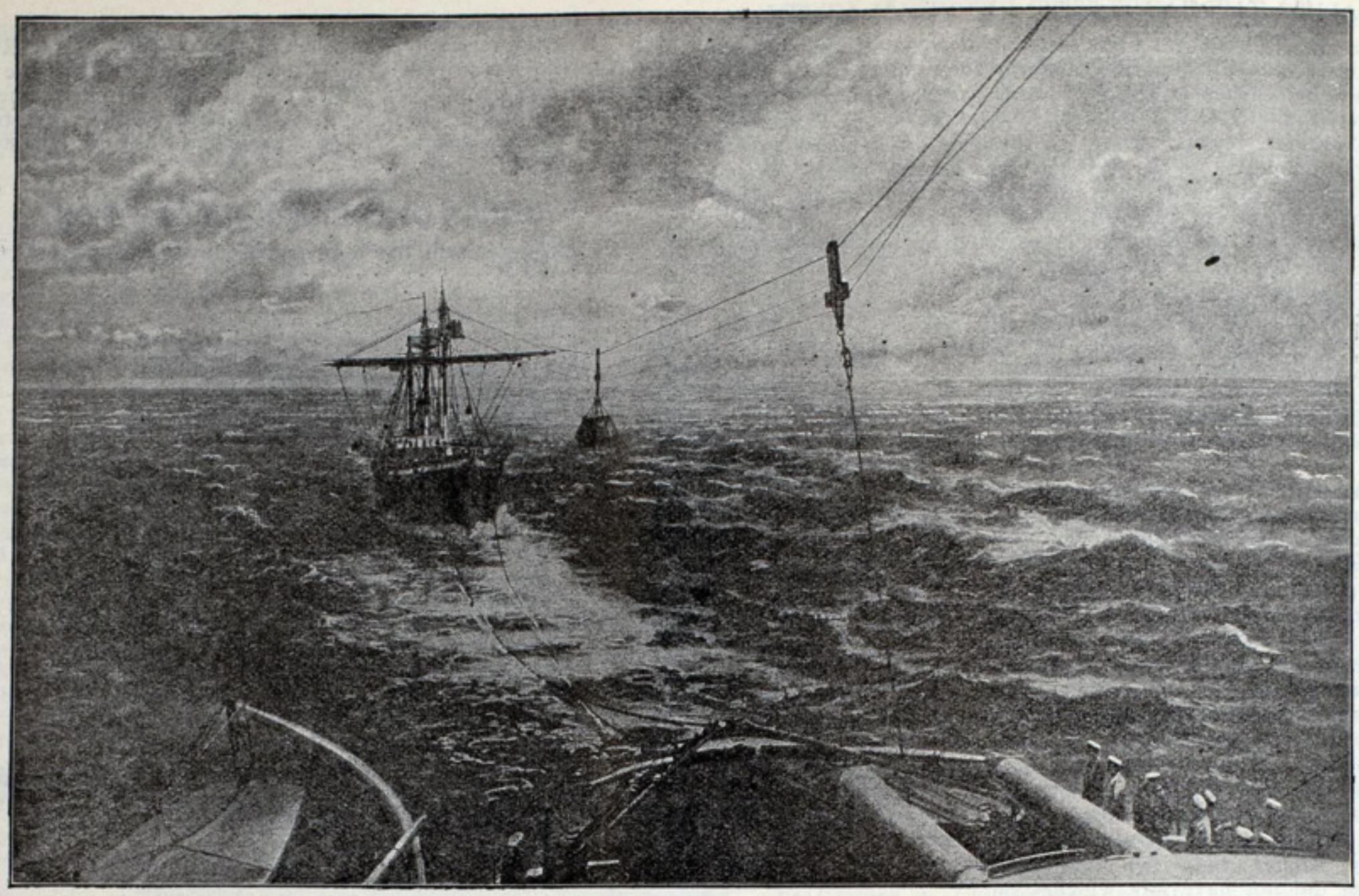
A letter received from Lieut. J. Skorohodof, of the Russian navy, who was present at the Cronstadt test, states that the result was in every way most satisfactory to the trial board, they and all officers of the ship being greatly pleased with the performance of the winches and all the gear connected with the operation of the cableway.

DESIGN OF CRUISERS AGREED UPON.

Final agreement has been reached in the controversy in the naval construction board over the designs for the two armored cruisers. The contest was between those advocating the sacrifice of protection to insure high speed and those believing in heavy protection, powerful armament and a narrow margin of horse power to obtain the required speed of 22 knots per hour. The victory is complete for Rear-Admiral A. T. Bowles, chief constructor, and a defeat for Rear-Admiral George W. Melville, engineer-in-chief of the navy, who believed in a liberal margin of horse power. This action by the experts may have a most important effect upon future ships of the navy. It may mean, indeed, that United States cruisers will not have the same speed for their tonnage and class as the cruisers of the other powers.

An important feature agreed to for the vessels is the great weight and thickness allowed the protective decks, as compared to those of other vessels of their class now under construction. No ship afloat has such decks and bulkheads as these are to have, and in side armor they will be protected with plates that would enable them to "stand and take" with line-of-battle ships in an engagement at average fighting range.

"They are not armored cruisers, but battleships," said Admiral Melville, after the board adjourned, "and will not be the vessels congress intended to be constructed. The act provided for battleships and armored cruisers, two of each, and stipulated that the latter shall be of 14,500 tons, and to have the highest practicable speed. These ships, as now agreed to, will



Russian Battleship Retvizan taking Coal at sea—Collier Asia in tow.

have the displacement stated, and no more, but they will be given engine power that may develop only the required speed of 22 knots."

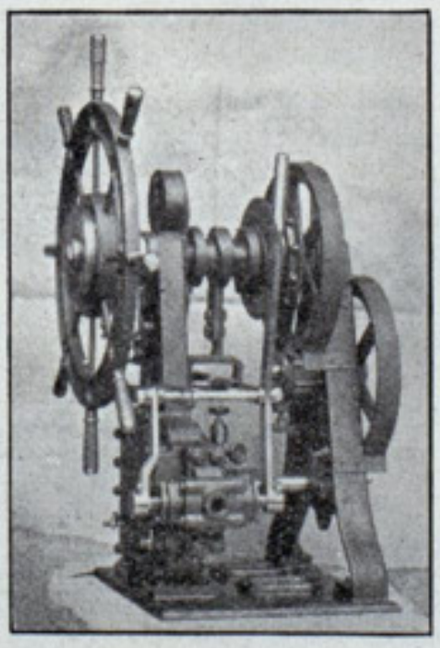
Four other rear-admirals on the board disagreed with Admiral Melville in his opinion that the ships would not be swift and powerful, and one, Admiral Bradford, believed too much sacrifice of weights had been made to attain protection, but he finally signed the majority report. Admiral Melville probably will not rest content with the action of the board, and may present a minority report, in which case Secretary Moody will have to decide between the opposing factions. There is unmistakable regret felt among engineer officers and by some line officers that the new ships should be allowed such reduced engine power as to make it problematical whether they will attain an official trial the speed requirements of 22 knots an hour. To fit them for coping with the most powerful and fleetest of British armored cruisers these ships would have to attain a speed of 23.5 knots an hour, which, on the same displacement allowed the American vessels, the British engineers give 30,000 H. P. to secure, as compared to 23,000 H. P. the American ships will by this plan be designed to generate.

When the board assembled at the final meeting both sides to the controversy seemed as firm as ever. On the main points regarding the designs for the ships the board was unanimous, and disagreement prevailed only on the question of speed. A difference of 2,000 in the horse power that should be allowed was the point involved, and whether the protective deck could not be reduced in thickness to allow for the increased weight for the machinery. Admiral Melville believed that the vessels should be given 25,000 H. P., which he estimates under the best conditions would generate 22.3 knots. Other members of the board advocated allowing weights for only 23,000 H. P., which they are confident will give the speed required. Admiral Melville says this will give only 21.5, and possibly 21.7 knots, and that, should the 22 knots be attained, it might be at the cost of serious injury to the engines, requiring dock yard attention before the ships go into commission. As agreed upon, these ships will be of 14,500 tons displacement, 22 knots speed, have a protective deck of 4½ in. and a belt armor 6 in. thick. The board admits that in actual conflict they might be classed with battleships of the present day. Completed each will represent about $6,000,000. Both ships will be built at private yards.

Representatives of several concerns engaged in the manufacture of chain throughout the country met at the Hollendan hotel, Cleveland, a few days ago. The Standard Chain Co., referred to as the trust in the chain industry, was not represented. Officers of the organization are: President, Charles M. Waumbaugh, Columbus Chain Co., Columbus, O.; vice-president, Robert McKay, James McKay & Co., Pittsburg, Pa.; executive committee, Charles M. Waumbaugh, of Columbus Chain Co., Columbus, O., Robert McKay, of James McKay & Co., Pittsburg; Mr. Lippman, of Nixdorf-Krein Mfg. Co., St. Louis, Mo.; and S. R. Wells, of United States Chain Co., Greenfield, Ind. A report to the effect that an effort was being made to form another combination of chain manufacturers was denied by one of the officers, who said that the association was one of a trade kind, dealing with measures of protection in regard to accounts, exchange of business views, etc.

DAKE PILOT HOUSE STEAM STEERER.

The illustration herewith shows a Dake steam steerer ready to place in the pilot house and to connect to steam pipe and steering chains. This apparatus is made by the Dake Engine Co. of Grand Haven, Mich., who also make the Dake double reciprocating square piston engine for steam or compressed air, which is especially adapted for direct or belt attachment to dynamos, fans, blowers, centrifugal pumps, hoisting machinery, cranes, windlasses, elevators, set works, net lifters, laundry machinery, etc., etc. The manufacturers say of the steering gear:



"It is driven by a Dake reversing engine, which is back-geared to chain wheel shaft by double gearing, fibroid gear bears being used on the engine shaft, making practically a noiseless machine. The engine valve is connected to the steering wheel by a lever, and the gear is stopped, started or reversed by moving the steering wheel slightly from center to center, either port or starboard. The gear is equipped with an automatic stop, which is adjusted so as to close the engine valve on the engine when the quadrant or tiller has reached its furthest point of travel, or hard over point. Arrangements are made to change the gear from steam to hand power, first, by throwing out the intermediate pinion, which is held in position by lock nut, and second, by releasing the valve lever and placing pin through hub of steering wheel. An indicator dial is furnished with the machine and the engine is equipped with an automatic oil pump, which provides perfect lubrication. Sufficient length of the best quality of block chain is furnished together with four guiding shelves, to connect the steering gear to tiller chains or cable. We claim for this machine a very simple, compact and durable gear, occupying a small floor space, thus enabling it to be placed in small pilot houses; also low initial cost. The gear is made in two sizes for engines of 5 and 8 H. P."

The Detroit Iron & Steel Co. has given to L. P. & J. A. Smith, of Cleveland, the contract for the construction of the ore docks at the new blast furnace plant on Zug island. The docks will be 2,000 ft. long.

SCOTTISH SHIP BUILDING LETTER.

Glasgow, Oct. 21.—Following are some particulars of the two cross-channel turbine steamers which Wm. Denny & Bros., Dumbarton, are to build, the one for the South Eastern & Chatham Railway Co., and the other for the London, Brighton & South Coast and the Western of France railway companies. The South Eastern & Chatham Co.'s vessel will be 310 ft. by 40 ft. by 25 ft. to the promenade deck. The passenger arrangements are to be most complete, the first-class accommodation being placed forward of the boilers, whilst on the lower deck will be the luncheon room and gentlemen's saloon, both immediately forward of the boilers. On the main deck will be a large central house entirely devoted to a ladies' saloon. On the upper deck there will be private cabins, and this deck will be covered by a boat deck, which will afford ample shelter for passengers who prefer remaining on deck. The second-class accommodation will be at the after end. The machinery will consist of Parson's turbines, three being fitted with three lines of shafting, the center shaft having one propeller, the two side shafts having each two propellers. In maneuvering the center shaft runs free, the two side shafts then take the place of ordinary twin screws, and, the maneuvering power is in every respect as good as in ordinary twin screws. In the going astern there is none of that objectionable vibration which is to be felt even in the most modern twin-screw balanced arrangement. As to speed, the builders have undertaken that the vessel will have an average sea speed of 21 knots. The dimensions of the vessel for the London, Brighton & South Coast Co. will be 280 ft. by 34 ft. by 22 ft. and her gross tonnage about 1,100 tons. She will be in general design like the Arundel, built in 1900 by the same builders for the same company, the passenger accommodation being excellently appointed and up to date. This vessel will be fitted with Parson's turbines, arranged in a similar manner to the other vessel. With the same boilers as the Arundel, it is anticipated that the new vessel will travel half a knot faster than that vessel, and that vibration will be practically done away with.

Lloyd's returns for the quarter ending with September show that, excluding warships, there were 388 vessels of 1,000,714 tons gross under construction in the United Kingdom at the close of the quarter ended Sept. 30, 1902. The particulars of the vessels are as follows, similar details being given for the corresponding period in 1901 for the purpose of comparison:

Description	Sept. 30, 1902 No.	Sept. 30, 1902 Gross tonnage.	Sept. 30, 1901. No.	Sept. 30, 1901. Gross tonnage.
Steam				
Steel	356	977,455	437	1,393,265
Iron	1	170		
Wood and composite	1	100	3	200
Total	358	977,725	440	1,393,465
Sail				
Steel	17	21,348	18	18,698
Iron				
Wood and composite	13	1,641	19	1,957
Total	30	22,989	37	20,655
Total steam and sail	388	1,000,714	477	1,414,120

The return shows a reduction in the tonnage under construction of about 129,000 tons as compared with the figures for the previous quarter, and of about 413,000 tons as compared with the high total which was reached in September of last year. The total building at the present time under the supervision of Lloyd's register is 403 vessels of 1,083,597 tons. Details of this total are:

	No.	Gross tonnage
Building in United Kingdom for home account for sale, etc.	285	720,194
Building in United Kingdom for foreign and colonial account	34	70,536
Building abroad for United Kingdom owners	6	1,190
Building abroad for foreign account	78	291,677
Total building on Sept. 30 for classification in Lloyd's register book	403	1,083,597

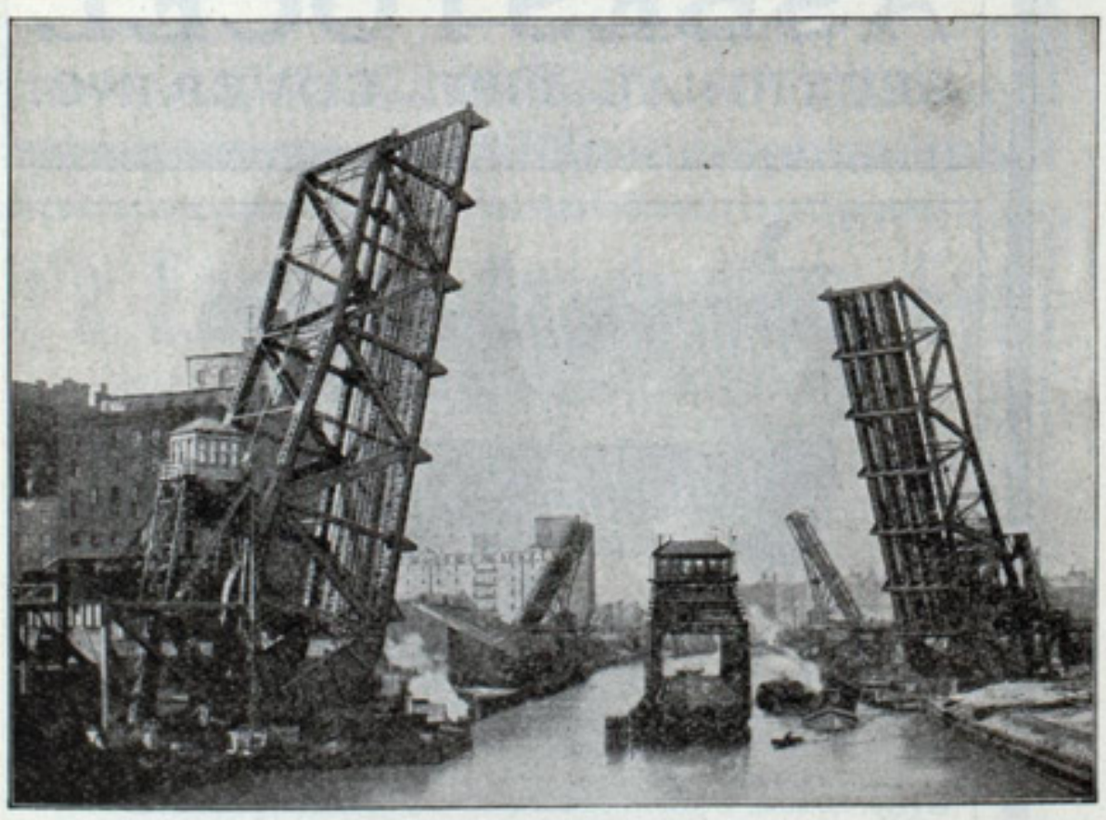
The totals under construction in the principal ship building districts were: Belfast 172,219 tons, as compared with 229,018 a year ago; Barrow, Maryport and Workington, 25,588, against 21,815; the Clyde, 356,462, against 448,540; Hartlepool and Whitby, 62,028, against 95,290; Middlesbrough and Stockton, 46,658, against 100,050; Newcastle, 173,829, against 279,426; and Sunderland, 125,005, against 190,509—a considerable reduction in every district except Barrow. The warships under construction amount to 303,202 tons.

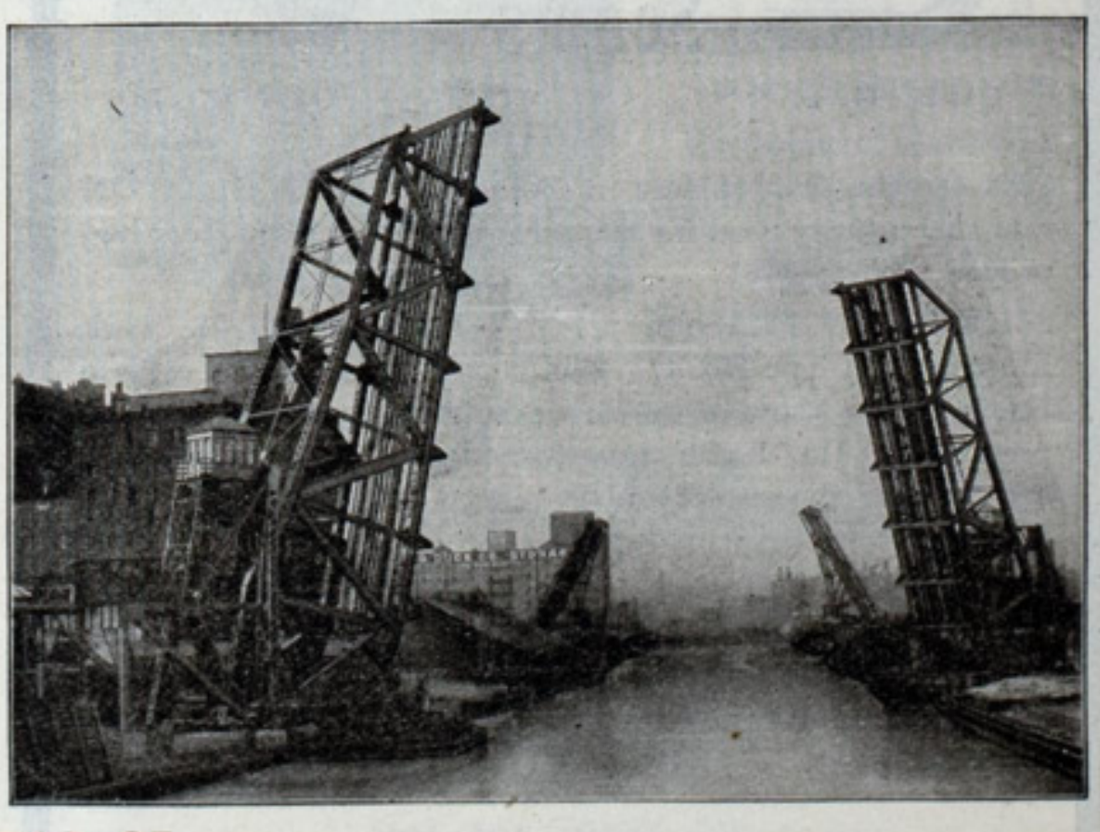
Returns from foreign countries show that the following was the work on hand Sept 30.: Austria, 16,850 tons; Belgium, 11,110; British colonies, 9,400; Denmark, 13,967; France, 89,870; Germany, 189,416; Holland, 29,928; Italy, 55,602; Japan, 11,570; Norway and Sweden, 36,961; Spain, 6,892; and the United States, 232,502 tons.

ANNUAL REPORT OF REAR ADMIRAL O'NEIL.

The annual report of Rear Admiral Charles O'Neil, chief of the navy bureau of ordnance, was made public this week. It discusses a variety of topics of interest. There is to be a general renovation of the batteries of the older ships and it is said that new batteries will be placed on the Baltimore, New York and Albany. It is recommended that the Philadelphia be given a new battery of 6-in guns. The bureau is considering the feasability of replacing the present turrets of the Oregon, Indiana, and Massachusetts with new elliptical balanced turrets, adding materially to their efficiency. The report gives a detailed account of the development of a new type of shell which combines the advantages of the armor-piercing with the common shell, that is, having the perforating power of the regular armor-piercing projectile with the capacity for a large bursting charge. The requirements for this shell on tests are that at a prescribed velocity it shall completely perforate unbroken a piece of hard faced armor a caliber in thickness, and then be in condition for effective bursting. A number of shells of this description have been ordered and the first three lots have successfully passed the requirements.

Admiral O'Neil says the ordnance wants $13,182,806 next year, of which amount $10,000,000 is to be devoted to arms and armament for new ships.





TWO VIEWS OF

THE SCHERZER ROLLING LIFT BRIDGE

across the Chicago River at entrance to the Grand Central Station, Chicago, before and after the removal of the old center pier swing bridge, showing the obstruction to navigation caused by the center pier and protection pier of the old swing bridge, and the wide and unobstructed channel given by the new Scherzer Rolling Lift Bridge.

Preliminary Sketches and estimates of cost furnished without charge to responsible parties in any part of the world, upon request accompanied by the necessary data.

THE SCHERZER ROLLING LIFT BRIDGE CO., Main Offices: 1616 Monadnock Block, CHICAGO, U.S.A.

MISCELLANEOUS MATTERS.

The caisson which was built by Cramps, Philadelphia, for the Charlestown navy yard dry dock, has been delivered. It is the largest ever seen in Boston.

The Spedden Ship Building Co., Baltimore, Md., will make extensive repairs to the United States survey steamer Blake. The company is to renew the whole main deck and deckhouse of the vessel from the forward end to the wardroom bulkhead.

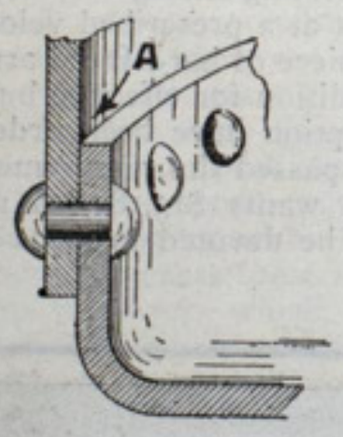
The barge Emilie, built by the New England Ship Building Co. for the Boston & Baltimore Barge Co., was launched last week. Her dimensions are 216 ft. over all, 35 ft. beam, 18 ft. 3 in. deep and her gross tonnage will be 1,069. She is to be a coal carrier.

The Daimler Mfg. Co. of Long Island City, N. Y., manufacturers of The Daimler motor, has purchased some eight acres of ground, having a water front of 400 feet, at Bergen Point, N. J., on which they are erecting shops of sufficient capacity to keep up with increasing trade. The company expects to move to the new location soon after the new year.

The Chicago Pneumatic Tool Co. reports recent large sales of pneumatic tools to the Newport News Ship Building & Dry Dock Co of Newport News, Va.; American Bridge Co. of Philadelphia; United States navy yard at Norfolk; department of public works of Sorel, Canada; New York Ship Building Co. of Camden, N. J.; and Pressed Steel Car Co. of Allegheny, Pa.

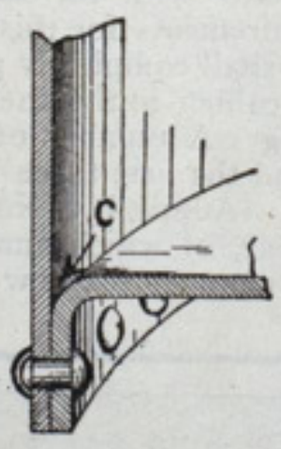
Recent orders awarded to the air compressor department of this company include five cross-compound compressors of 600 ft. capacity each for the Baltimore & Ohio railroad; two compressors of 2,000 ft. capacity each for the Pressed Steel Car Co.; 2,000-ft. compressors for the Kawasaki Dock Yard, Japan; two 600-ft. compressors for the New York, Ontario & Western railroad, and one 700-ft. compressor for the signal department of the New York Central & Hudson River railroad.

Joseph Allen, Collingwood, N. J., who makes a patent condenser tube packing, designed to take the place of the old-fashioned corset lacing, makes the following reply to an inquiry from an engineer: "This packing is made of the best American cotton, is woven in a special manner, comes in the form of a sleeve, and is lubricated or treated with a compound that enables it to be slipped over a tapered tool. We claim that one man can pack from 1,500 to 2,000 tubes per day, while the packings last as long as the tubes. What hitherto has been a disagreeable and tedious job, has now been transformed into an agreeable and pleasant task. This packing is used by the leading condenser builders and ship builders of the United States and other countries. Samples and tools for inserting the packings will be sent free of charge."



CUT O. 1.

Repairing Leaking Seams



CUT NO. 2.

Cuts showing two places in Boilers where SMOOTH-ON was successfully used for stopping leaks, after caulking had proved unsuccessful.

SMOOTH-ON ELASTIC CEMENT was used for work illustrated by cut No. 1. The cement was applied with a brush to the seam A its entire length, then the working pressure of the Boiler was turned on, which forced the cement into the seams and stopped all leaking.

SMOOTH-ON COMPOUND IRON CEMENT NO. 1 was used for work illustrated by cut No. 2. A layer of cement was placed at seam C its entire length, so as to make a fillet around the inside of the joint between the head and shell allowed to stand twelve hours to metalize and made the seam perfectly tight.

WRITE FOR ILLUSTRATED CATALOGUE, FREE.
FOR SALE BY SUPPLY HOUSES.

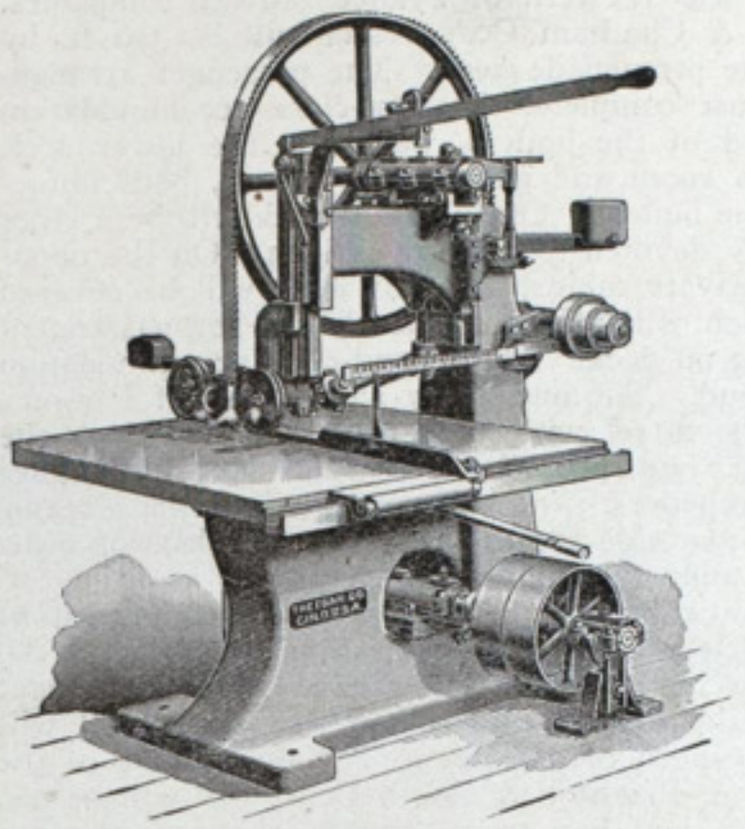
Smooth=on Mfg. Co.

572=574 Communipaw Ave.,

JERSEY CITY, - - NEW JERSEY.

IMPROVED BAND RIP SAW.

Manufacturers of the band rip saw illustrated herewith find that it has been highly successful wherever it has been used and are, therefore, very enthusiastic in the claims they make for it. It is new in all its parts and is intended for all woodworkers. It is covered by patents of Feb. 27 and Oct. 2, 1900. Features to which the makers of the machine especially direct the attention of all who have ripping to do are as follows:



1. It will rip to 24 in. wide and to 10 in. thick without changing blades, working quickly and accurately in either hard or soft wood. and with no danger to operator of stock being thrown back. All the different adjustments are easily and quickly made, saving time, labor and attention.

2. The patent straining device, used in connection with the top wheel hanging solely on a knife edge balance, insures at all times an even and uniform tension on the saw blade, a decided improvement to lengthen its life. The lower wheel being solid lessens circulation of dust, increases momentum and prevents the upper wheel from over running it. Owing to the thinness of the saw blade, the slight kerf removed is a saving which will be readily appreciated by all users of fine lumber.

3. The feed is powerful, steady and uniform, and the rate furnished as desired. The feeding-in and feeding-out rolls being close together, short stock can be worked to advantage. By a single movement of a lever the machine can be used as a hand feed rip saw.

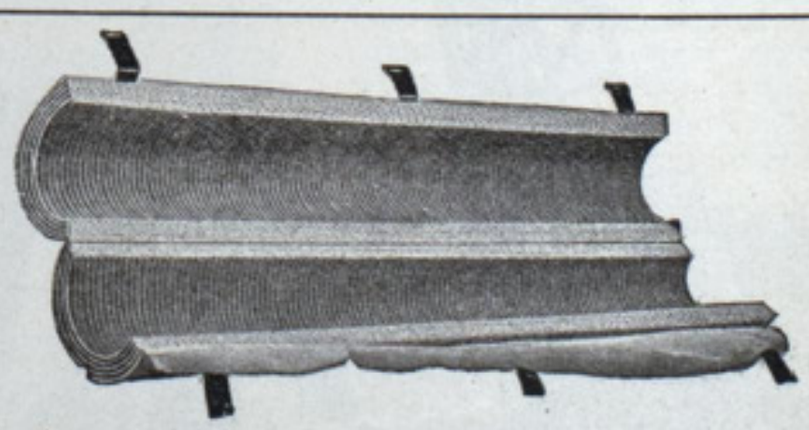
4. For shops where flooring is made in large quantities the machine can be fitted with a long table on which are rolls for quickly returning the material, thus saving much valuable time and materially increasing the output.

The makers of the machine, J. A. Fay & Egan Co., Nos. 325 to No. 345 West Front street, Cincinnati, O., will be pleased to hear from those interested, to whom they will send full particulars, terms, and descriptive matter, as well as their new illustrated pamphlet on the care of band saws. They have just brought out a complete catalogue, which they will send free to those interested who will write mentioning this paper.

ASBESTOCEL

SECTIONAL PIPE COVERING.

(Patented.)



Consists of several layers of corrugated asbestos paper, placed so that the corrugations run CONCENTRICALLY AROUND THE PIPE. Each channel, therefore, forms a closed loop, in which the air is effectually imprisoned, instead of forming a long channel through which more or less circulation can take place, as in longitudinal air cells.

These circumferential channels occur between each of the several layers, forming a covering of the highest insulating efficiency.

We manufacture money saving insulating coverings to meet every requirement under all conditions, and should, therefore, be glad of an opportunity to take the question up with you in detail.

Send for Catalogue A, or a representative. Either will come to you promptly.

H. W. JOHNS-MANVILLE CO.,

100 William Street, New York.

MILWAUKEE, CHICAGO, ST LOUIS. BOSTON, PHILADELPHIA. PITTSBURG, CLEVELAND, NEW ORLEANS, LONDON.